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Edited by E. T. Baker

Annette K and Brushup (See Page 262)

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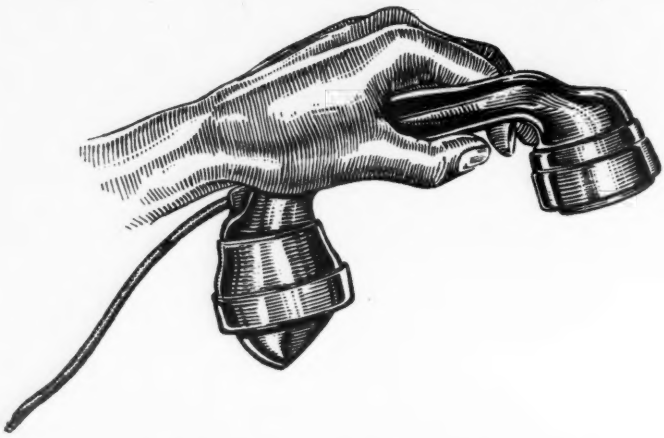

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Horses and Mules Are Still a Good Bet

"When somebody begins predicting a bad future for horses and mules," says Wayne Dinsmore, "just remind them of the following facts:

"The horse and mule industry represents the largest capital investment of our live stock industry.

"Conservative estimates by the Bureau of Agricultural Economics, January 1, 1937, disclose that horses and mules had an aggregate value of $1,739,067,000, which was more than twice the total value of all sheep and swine. The value of horses and mules exceeded the value of all dairy cattle by more than $475,000,000 and of all beef cattle by more than $728,000,000.

"Direct attention also to the fact that of the 6,812,350 farms, 4,138,433 were under 100 acres in size. On these farms there is little likelihood that horses and mules will be materially displaced. There are 1,404,297 farms from 100 to 175 acres in size, and as pastures and meadows usually take half or more of their acreage, there is slight justification for use of other types of power than animals. This leaves only 1,269,620 farms of larger size, on which it may be possible to justify the use of tractors for part of the work, when feed costs are high; but over many years animal power is cheaper even on such larger farms.

"The thirteen Eastern and ten Southeastern states, mainly in small farms, will need around 153,000 horses and almost 250,000 mules during 1938, over and above what they have raised. Approximately 413,000 horses and mules must be supplied to maintain replacements alone in these states.

"Farmers who work mares, and raise colts for replacements, therefore have reasonable assurance of steady demand for their mature animals.

"Pastures—permanent and temporary—are the key to success in raising and using horses. A mixture of wheat, oats and barley, broadcast in March at the rate of four or five bushels to the acre, will make wonderful pasture in May and June. Such heavy seeding makes a firm turf. Sudan grass sown in May, will afford excellent horse pasture in July and August. The permanent blue grass pastures, available in March and April, can thereby be conserved for fall and winter, and for days when land is too wet to turn horses on the grain pastures. The permanent pasture should be supplemented with more grain pastures, sown in August, for grazing in November and December."

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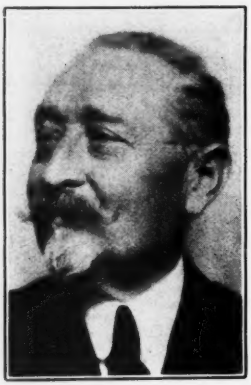

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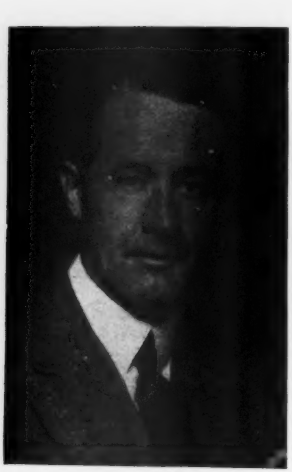

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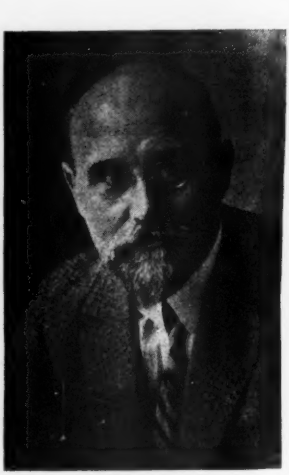

Prof. Dr. W. Frei
Director of Veterinary Pathology, University of Zurich, Zurich, Switzerland.

The 13th International Veterinary Congress will be held at Zurich, Switzerland, Aug. 20-25 and at Interlaken, Switzerland, Aug. 25-26, 1938. The cost of membership in the Congress is $7.50. Remittances should be made to Dr. H. Preston Hoskins, 221 N. La Salle St., Chicago. All members of the Congress will receive a printed report of the proceedings, aggregating three large volumes.

Infectious Equine Encephalomyelitis and Its Biological Treatment

By EDWARD RECORDS,
University of Nevada, Reno, Nevada

Introduction

During 1930 Meyer, Haring, and Howitt established the presence of a filterable virus in connection with a disease of horses then epizoötic in California.[1] This disease has since by common usage been given the name of infectious equine encephalomyelitis. A survey by the U. S. Bureau of Animal Industry released in January, 1938, shows that it has been diagnosed in more or less epizoötic proportions in 37 of the 48 states.[2]

This has two natural results; a flood of publications covering all angles of the disease and widespread attempts to treat and control it with biologic products prepared from the virus. It may therefore be worthwhile at this time to sum up briefly what may be expected from the biologics so far developed and present a list of references readily available to all veterinarians covering at least the practical aspects of the disease such as epizoötiology, differential diagnosis, treatment, and control.

Antiserum

Reports on the use of antiserum in the treatment of encephalomyelitis have been variable and even confusing. There are two natural causes for this. First, the product is a relatively new one, and so far no one has succeeded in producing a serum of high potency as compared to most of the established antibacterial sera. Up to October, 1937, the U. S. Bureau of Animal Industry had not established a standard of potency which this serum would have to meet before distribution under Bureau license.

Second, disappointing results in the treatment of clinical cases have far too often been attributable to errors in its use. The most common of these have been inadequate dosage; administration to cases so far advanced or of such a fulminating type as to be hopeless, and overtreatment with active drugs, or other radical measures. Where these pitfalls have been avoided the results have generally been good in arresting the progress of the disease and reducing the mortality rate.[3, 4] The essentials to success are a reasonably potent serum, early intravenous administration of liberal dosage up to 1,000cc or even more, conservative adjunct treatment, and above all, good nursing. In the administration of the large dosage indicated the usual precautions to avoid shock must be observed and accurate differential diagnosis is of course essential if disappointing and confusing results are to be avoided.[4, 5, 6, 7]

Another and perhaps economically even more valuable use for the antiserum is to confer an immediate passive immunity. Whenever a clinical case appears in a group of susceptible horses it is a good practice to take temperatures on all, and to give a fairly liberal therapeutic dose of antiserum to any that show an elevated temperature, and 50 to 75cc to all the others. This will usually prevent the development of additional clinical cases, though any animals showing a high temperature should be watched carefully for several days.[4, 8]

In following this procedure it should be clearly borne in mind that the immunity conferred, while almost immediate, is but temporary, lasting only approximately two weeks. If more lasting protection is required it must be supplemented in some way. The Army Remount Service reports satisfactory results from the systematic administration of additional prophylactic doses of serum every two weeks until the danger season is past. This procedure, however, is hardly practicable under ordinary conditions.

Another method for obtaining practically solid protection for at least the remainder of any one season is to administer a small dose of live virus vaccine simultaneously with the protective dose of serum. If the vaccine is not immediately available, this administration can be delayed up to 48 hours

following the serum injection without impairing its efficacy.[8, 9]

Vaccines

In spite of its extensive use in the field, reports on the results obtained from the formalin-killed vaccine now on the market commercially are very conflicting.[11, 12] This is not surprising in view of the fact that these reports are based merely on observations on field use where many unknown factors such as previously acquired immunity or resistance in the horses vaccinated or the lack of actual severe exposure after vaccination cannot be determined.

The federal Bureau of Animal Industry recently issued a summary of the results in 10,392 horses given this vaccine in eleven states in 1937, of which all were injected at least 30 days prior to the epizoötic appearance of the disease in the locality.[2] The percentage of clinical cases occurring among the vaccinated horses ranged all the way from zero in six states up to 40% in one. This tabulation also indicates that the percentage of cases among the vaccinated horses corresponded very closely with the prevalence of the disease and the consequent degree of exposure.

To date we have failed to encounter any published report covering the administration of this material to a reasonably large group of known susceptible horses, their subsequent exposure to severe natural infection along with an adequate number of known susceptible unvaccinated controls, and a statement of the results obtained. Until such an experiment is conducted and reported, we feel that the efficacy of this product as it is finally delivered to the veterinarian for use in the field must be accepted with rather marked reservations.

It must be said for this product that its use is at least harmless in so far as any direct danger of establishing infection is concerned. On the other hand, it is quite expensive, and there have been many reports of undesirable local reactions at the site of injection. Another factor which should be guarded against in connection with its use is the establishment of any feeling of false security until its efficacy is better established.

Limited observations to date indicate that this product should not be used in any combination with antiserum. Weakly antigenic at best, the serum appears to prevent the development of any active immunity.

Another method of immunization which has been used to a limited extent is the administration of a small dose of live virus unmodified except by a long series of passages through guinea pigs, well in advance of the seasonal prevalence of the disease. This method establishes a practically solid immunity which is known to last for at least approximately six months and it has the additional advantage of being very inexpensive. On the other hand, the method has definite undesirable features. In a very small percentage of susceptible horses the vaccine has apparently been directly responsible for clinical cases of the disease even in the absence of natural exposure.

An even greater disadvantage is the fact that under field conditions it is often difficult or impossible to determine the presence or absence of natural exposure before the administration of the vaccine is undertaken. When, through an error in judgment in such a connection, the vaccine is given to an animal in the incubative stage of the disease or exposed to severe natural infection, an aggravated and acute type of the disease may be produced which fails to respond to even heroic serum treatment or other measures. On the whole, therefore, we do not feel that this method is to be recommended, especially in view of the fact that the more conservative serum-virus method is also relatively inexpensive.[9]

In the serum-virus method a small dose of the living vaccine virus previously referred to is administered simultaneously with from 50 to 75cc of reasonably potent antiserum. This method has already been used on approximately 7000 horses and mules with very gratifying results. It has apparently never directly produced a clinical case of the disease. The serum seems to confer almost immediate passive immunity as no new clinical cases appeared even in groups of horses exposed to severe natural infection after the fourth day. All the cases which developed during this brief interval

as the result of infection prior to vaccination recovered, often without additional serum treatment. On the other hand, there is ample evidence that the serum administered does not block the creation of a practically solid immunity by the virus which lasts more than long enough to protect the animal during any given season.[9, 10] One outstanding advantage to this method is the fact that it can be used equally well for preseason immunization or during the height of an outbreak as referred to under serum treatment above.

The use of the live virus vaccines referred to above is limited to states where the proper authorities have approved same and arrangements have been made for their production and distribution. No federal licenses have as yet been issued covering their production and interstate shipment by commercial laboratories.

In connection with the use of antiserum as outlined, it should be pointed out that there has been a tendency to blame the occurrence of the so-called post-encephalomyelitis, or X-disease, on the use of this product.[10] When this possible complication was first pointed out there seemed to be considerable circumstantial evidence that the serum was in some way responsible. Subsequent and more careful surveys, however, have served to weaken this theory.[3, 12]

Looking at the matter impartially, it seems difficult to believe that the administration of the antiserum could have any particular bearing on the occurrence of this condition. This serum is produced by several different commercial laboratories at widely scattered points in the United States from horses naturally derived from different areas. In addition, it is filtered through a Berkfelt filter, tested for sterility and pasteurized in accord with federal standards before it is released for use. It is hard, therefore, to conceive of this product carrying any bacteria or virus capable of setting up a disease condition. Furthermore, rather extensive work to date has failed to establish the fact that post-encephalomyelitis, or X-disease, is an infectious or contagious one, attempts to transmit it to experimental horses or laboratory animals having been unsuccessful.[2, 10, 12]

Further work will probably eventually establish the true nature of this condition, but in the meantime we do not feel that on the basis of the evidence available it offers any valid argument against the intelligent use of equine encephalomyelitis antiserum.

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Cowboy and Rope

Treatment of Encephalomyelitis

By E. L. NYE, Lt. Col. V. C.,
Fort Meade, South Dakota

The writer has experienced several outbreaks of equine encephalomyelitis (western)—outbreaks in California, Idaho and South Dakota. The various symptoms and manifestations of this disease are well known. It suffices to say that all reported forms of the western type of infection have been observed in these various outbreaks.

The epizoötic observed in western South Dakota, during the late summer and early fall of 1937, was but a flare up of the disease, which is enzoötic in this area, occurring with varying intensity from year to year. As there are no veterinarians practicing in this area, the veterinary service at Fort Meade was called upon frequently to assist the desperate farmers and ranchers whose horses were involved.

This outbreak included all the types of the disease to be found in a severe general epizoötic. Most of the farms or ranches were involved; yet in certain instances groups of horses entirely surrounded by infection escaped. The incidence of infection for the area was between 90% and 10%. All ages of horses seemed equally susceptible. Cases were encountered in aged animals and suckling colts. The epizoötic was severe and presented all possible symptoms, or combinations of symptoms. including certain apparently peracute cases—a type not previously encountered by the writer. In such cases the onset was sudden; the symptoms developed rapidly and violently; and the attack terminated fatally in six to eight hours.

The veterinary profession as a whole is apparently somewhat uncertain as to the value of vaccine and serum in the control or treatment of encephalomyelitis. It was my good fortune to use some of the first serum developed by the University of California. Even this early serum, used on cases at Stanford University was effective, and an extended experience since that time has confirmed my belief in the efficacy of both the vaccine and the serum.

When it became apparent that the epizoötic of 1937 in South Dakota would be a severe and general one, it was decided to use vaccine where time permitted, and serum in treating cases already developed. However, all available supplies of these biologics were soon exhausted and the manufacturers were unable to produce enough to be of any real help in a general outbreak. It is most unfortunate that the supply was exhausted so soon, when such a favorable opportunity for determining the value of vaccine and serum existed. Owing to their scarcity the biologics were used only where the incidence was highest. In these areas 168 animals were treated with the following results:

Number treated	168
Number protected	150
Number not protected	18
Died	12

Percent effective 89.28.

Seventy-eight animals in herds in which the disease had already appeared were given serum with the following results:

Number treated	78
Number protected	72
Number not protected	6
Died	1

Percent effective 92.3.

It appears from the above that vaccine and serum were over 90% effective taken together. This seems a very satisfactory rate; certainly good enough to justify the use of these products. It is interesting to note that of 18 cases occurring after the use of vaccine six recovered with no additional attention; and of six cases occurring following the use of serum five recovered with no further treatment.

The failure of the supplies of vaccine and serum made it imperative to rely upon medical treatment. To this end the procedure given below was developed and followed most successfully with our western type of infection. The writer does not claim originality for this treatment, but has not heard of it being used elsewhere. In fact, some writers have stated that treat-

ment along these lines is contraindicated. All that can be said for it is that in 45 cases it was 88.8% effective and failed only in cases so far advanced that no treatment should have been attempted. Surrounding cases not treated died rapidly. The infection was generally severe.

The treatment is as follows:

1. Give immediately one grain arecoline hydrobromide hypodermically.
2. Half an hour after the injection of arecoline give half a grain of strychnine.
3. Repeat the strychnine one hour later.
4. One hour after the second dose of strychnine, give a third dose of the same size.

The animal should be kept in a cool, quiet place and ice packs should be placed on the poll. No other treatment than the above was used and in 40 out of the 45 cases relief was prompt and permanent. The five moribund cases, treated only to satisfy the owners, were given additional medication, but nothing done for them arrested the course of the disease.

The figures below give the picture:

Medical treatment.

Number treated	45
Recoveries	40
Deaths	5

This treatment is somewhat empirical. The writer's theories as to the effects of the treatment, which are but partially satisfactory, are as follows: The purgative action of arecoline contributes undoubtedly to effect a prompt evacuation. The profuse salivation and excessive secretion of intestinal fluids and of perspiration it induces assist in reducing blood pressure. The rate of respiration is reduced, and any reduction in the expenditure of energy is indicated. Arecoline is a depressant to the circulatory system and thus in some measure arrests the increase of blood in the meninges and brain tissue. The stimulation of all secretions and emunctories assists in reducing the pressure of the increased subarachnoid fluid always present in cases of encephalomyelitis.

The strychnine, of course, is in some measure opposed to arecoline in action. notably in increase in respiration and blood pressure. However, these disadvantages are outweighed by the benefits. With proper use of strychnine there is stimulation of intellect and motor areas. Special senses are stimulated, and above all consciousness is retained. This latter is most important as the coma usually attendant upon encephalomyelitis is at least retarded. As stated above respiration is stimulated and is quickened and deepened. However, this is checked by the arecoline. Muscle tone is improved and there is increased muscular power and improved reflexes. This action assists in counteracting the muscular incoordination of encephalomyelitis.

So much for the action of the remedies employed. It will be noted that the writer is not too clear as to why the results are obtained. It can only be stated again that the treatment works.

It appears that there is much yet to be learned as to the means of transmission of this disease. It has been demonstrated that certain mosquitoes can transmit the virus. However, there must be other means of transmission for cases and outbreaks have occurred in this semi-arid region where mosquitoes are so rare as to be practically unknown. It seems obvious that much further investigation will be necessary before all the facts relative to the transmission of equine encephalomyelitis are known.

* * * *

Area bot treatment is one of the most important moves in the battle against equine parasites.

Normal horse serum, given in the first stage of laminitis, is almost a specific.

Hypodermic injections should always be followed by thorough massage of the parts.

Practitioners who believe in rugged individualism; who never attend association meetings; who seldom read professional journals, and who care for no one except "Me, myself and I," sometimes accumulate good estates for the lawyers to divide among themselves.

Encephalomyelitis in Montana

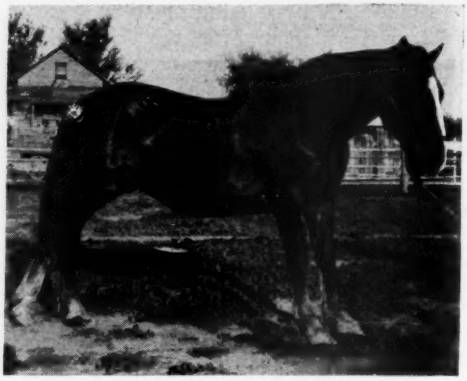
By HADLEIGH MARSH,
Bozeman, Montana

Montana was free from encephalomyelitis until 1935, when there were reported 135 cases scattered through the eastern part of the state, occurring between August 18 and October 24. In 1936, the area in which the light outbreak occurred in 1935 was practically free from the disease, but 322 cases were reported in the state, concentrated principally in three areas. The first cases were reported on July 27 in the Bitterroot Valley west of the continental divide, where the largest number of cases occurred. The two other areas where there was a concentration of cases were in the vicinity of Great Falls and Billings.

The diagnosis was confirmed in 1936 by the recovery of Western type virus from two of the early cases by Dr. H. R. Cox of the Rocky Mountain Laboratory of the United States Public Health Service.

The chief point of general interest in connection with the Montana outbreak is the fact that the Livestock Sanitary Board used the simultaneous serum and virus method of immunization as described by Records and Vawter of Nevada. The virus was prepared by the Montana Veterinary Research Laboratory from a strain of virus received from Doctor Records, and according to the method recommended by him. The virus was injected subcutaneously in doses of 2cc for adult horses and 1cc for colts under one year old. At the same time, 50cc of antiserum was injected. The number of horses immunized by this method was 5193. The results indicated that immediate immunity was established as only nine cases of encephalomyelitis were reported in vaccinated horses. Five of these appeared within four days following vaccination, which indicates that the disease was already developing before vaccination. Three of the other four cases, which occured within nineteen days after vaccination, were in sucking colts, in which it appears to be more difficult to develop immunity than in older horses.

About six weeks after the 1936 encephalomyelitis outbreak subsided, there occurred in the same areas where the disease had occurred, 89 cases of a highly fatal disease, the nature of which is as yet unexplained.



Typical Montana Type of Encephalomyelitis.

The condition was evidently the same as that described as the "second wave" of encephalomyelitis in Utah in 1933. Similar losses were reported in Wyoming and Colorado in 1936. The clinical symptoms of these cases indicated a cerebral disturbance, but the symptoms differed very definitely from those of typical encephalomyelitis. The disease was very acute and was fatal in 90% of the cases. The symptoms were those of excitement, as contrasted with the sleepy symptoms of encephalomyelitis. The horses were constantly in motion, pushing forward through obstacles. There were muscular tremors, profuse sweating, and impaired vision. No rise in temperature occurred, and the pulse and respiration were practically normal until the final stages of the disease. In most of these horses there was no prostration. They died on their feet.

The cause of these losses was undetermined. Both the Public Health Service Laboratory and the Veterinary Research Laboratory failed in attempts to demonstrate the presence of the virus of encephalomyelitis. Histological examination of the

central nervous symptom of our cases, and similar examinations made in Colorado, failed to establish the presence of any nerve lesions. Pathological changes in the liver were constant.

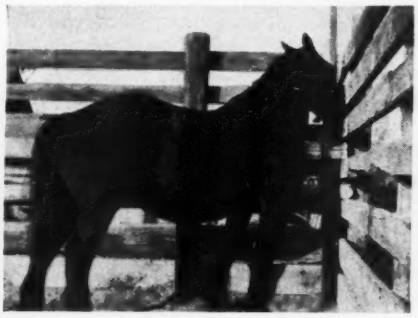
"Secondary Disease" in Montana.

Of the 89 cases of the secondary disease which occurred in Montana, 81 were in horses which had been immunized with serum and virus or with serum alone. This fact and other circumstances lead us to suspect that the use of serum in an infected area had some connection with the development of the secondary disease, although there was sufficient evidence that the serum itself was not directly responsible.

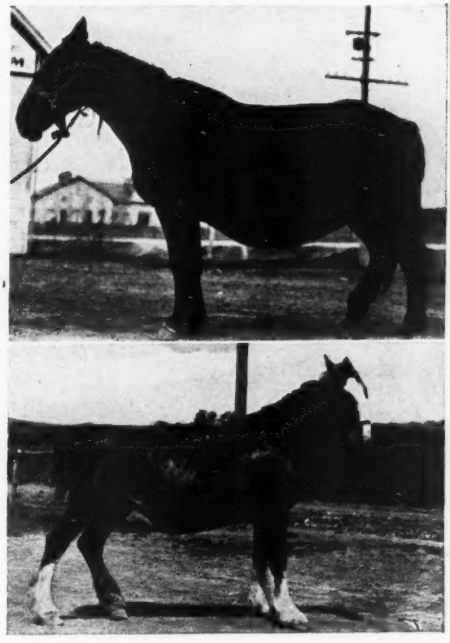
In 1937, encephalomyelitis again appeared in Montana, the number of cases reported being 743, more than double that reported in 1936. The distribution was more general, with less concentration in any one area.

It was decided in 1937 not to use any immunizing agents, except in cases of owners who wanted to use the formalized virus vaccine early in the season. In general, the course of the epizoötic did not seem to be materially different from that of the 1936 outbreak, when serum and serum and virus were used. It is to be noted, however, that no cases of the disease were known to have occurred in 1937 in horses vaccinated with serum and virus in 1936, with one exception, which was a horse which had been vaccinated as a sucking colt.

It also seems to us significant that, although there were twice as many cases of encephalomyelitis in 1937, there was reported only one case of the secondary disease, and this occurred in one of the very few horses to which a prophylactic dose of serum had been administered during the summer outbreak.



Violent case of "Secondary Disease." A "pusher" just before death.



Above: Impending rupture of the prepubian tendon. There is great edema of the ventral wall of the abdomen, but otherwise the organs are in normal position.
Below: Rupture of the prepubian tendon. Note the forward position of the mammary glands, the tilt of the pelvis and the swayed back.

Brain Fever in Brief

We asked Dr. H. R. Groome, Twin Falls, Idaho, the following questions regarding encephalomyelitis, with which he has had a wide experience. His answers are as follows:

Q. *When did brain fever first appear in southern Idaho?*

A. A very few cases appeared in 1934; in 1935, about double the number of the preceding year; in 1936 very bad, and in 1937 the disease was somewhat limited in this area.

Nervous Type of Infectious Encephalomyelitis
—Photo by Newsom

Q. *What are the first symptoms noted?*

A. Unsteady gait. Very sleepy. High temperature.

Q. *When does the disease usually appear in your locality?*

A. About the first of August.

Q. *Does it attack horses of any age, breed, sex, etc?*

A. Yes.

Q. *When is the best time to vaccinate horses in infected areas?*

A. May and June.

Q. *From your observation and experience do you think the vaccine a good preventive?*

A. Yes.

Infectious Encephalomyelitis in Colorado
The pendulous lips are characteristic of the disease.
—Photo by Newsom

Q. *What lines of treatment have given you the best results?*

A. Intravenous medication, such as serum, normal horse serum, acriflavine, saline solution, cathartics and diuretics. The stomach tube is quite essential in treating these cases. Ice packs and rectal injections are beneficial also. Place the animal in stocks if there are "signs of going down".

Q. *What are common unfavorable symptoms?*

A. Highly nervous types; also down type unable to rise or to use legs when raised with pulleys.

Q. *What suggestion would you give a practitioner when the disease breaks out in his territory?*

A. Call into play all his common sense. Try to calm the hysteria that accompanies the epizoötic. Guard against empirics and their panaceas. Emphasize to the owner that his patient's chances are quite dependent on following your instructions.

Q. *Do you think the presence of a disease of this kind in a community has a tendency to drive farmers to mechanized equipment?*

A. Yes, positively yes.

Clinical Picture of Brain Fever

Q. *What are the first clinical symptoms?*

A. Temperature; not eating as much as usual.

Q. *When do they usually appear?*

A. A few days before showing sleepiness, and disturbed locomotion.

Cornstalk Disease (Toxic Encephalomyelitis).
—Photo by Graham

Q. *Is the vaccine any good, and when should it be given?*

A. Yes. Give about two months before season for an outbreak.

Q. *What line of treatment seems to give the best results?*

A. Keep on feet if possible; ice packs on head; enemas of cold water; give water often.

Q. *What are unfavorable symptoms?*

A. Any nervous symptoms.

Q. *Do you think the bot fly has anything to do with the transmission?*

A. No. Mosquitoes, I believe, may be carriers.

Q. *What is the best line of therapeutic measures to take when an outbreak starts in a hitherto uninfected territory?*

A. Keep animals in the barn; vaccinate; use serum when you find infection.

Infectious Encephalomyelitis
This animal stood in this position most of the time.
—Photo by Newsom

Q. *Do age, sex, food, or care seem to have anything to do with the progress of the disease?*

A. Age, sex, and food, no; care, I believe does, and shelter.

R. S. GERARD.

Sigourney, Iowa.

Horses and Mules

Texas, with 890,000 mules, leads all the other states in the number of these animals by a large margin.

North Carolina, South Carolina, Georgia, Florida, Mississippi, Alabama, Kentucky, Tennessee, Louisiana, Arkansas and Texas all have more mules than horses. The figures for these eleven states are 3,367,000 mules and 1,542,000 horses.

With only 2,000 horses, Rhode Island is firmly entrenched in the "cellar position". Illinois, with 746,000 horses, is second, with Iowa first.

Texas, with over twenty million head of livestock, contains over one-tenth of all the domestic animals in the United States.

Recurrent Ophthalmia (Iridocyclitis)

By CARL F. SCHLOTTHAUER,
Rochester, Minnesota,
Division of Experimental Medicine,
The Mayo Foundation

IT IS generally agreed that moon blindness, periodic ophthalmia, recurrent ophthalmia, specific ophthalmia, uveitis and primary iridocyclitis of horses, mules and asses are all one and the same disease. Undoubtedly, either of the last two terms would more correctly describe this disease. The term "uveitis" was suggested by Savage [1] but Nicolas [2] preferred to use the term "primary iridocyclitis." For convenience and to avoid confusion I shall use the term "recurrent ophthalmia" in this discussion.

Various inflammatory diseases of the eyes are known to occur among horses, mules and asses. These diseases must not be confused with recurrent ophthalmia, which is a specific disease that primarily affects the iris, ciliary body and the lens. The cornea and the posterior structures of the eye usually remain unaffected until several attacks have occurred. However, one severe attack will, occasionally, permanently destroy the function of an eye. This disease has a strong tendency to recur again and again; it frequently terminates in blindness which is the result of cataract or other destructive lesions. It commonly occurs first in one eye, but both eyes may be affected simultaneously.

The etiology of recurrent ophthalmia has not been definitely established. Diet, climate, seasonal influences, various environments, hereditary predisposition, overwork, trauma, parasites, bacterial organisms, viruses, and lack of specific vitamins have all been credited with etiological significance. However, the theory of infectious origin is the only one that has any experimental support. Wilkie [4] was of the opinion that recurrent ophthalmia is infectious and that each recurrence depends on reinfection. I, too, am of this opinion.

Because recurrent ophthalmia is primarily anterior uveitis or iridocyclitis, the earliest symptoms noted are conjunctivitis, lacrymation and photophobia. The last symptom is manifested by drooping of the eyelid (ptosis) and by contraction of the pupil (miosis). As the disease progresses the conjunctivitis becomes more marked and the discharge from the affected eye generally becomes mucopurulent. The aqueous humor may contain blood or a pus-like exudate and appears turbid. The cornea may be opaque and the opacity may simulate primary interstitial keratitis. However, this probably is due to the increased intraocular pressure which usually is present. The phenomenon of the corneal opacity can be demonstrated in a normal eye by increasing the intraocular tension in any manner (mere squeezing of the eye will do it). The degree of opacity depends on the degree of increased intraocular pressure and if the latter has not been too great the opacity disappears immediately when the pressure is decreased. The absence of primary destructive lesions in the cornea is one of the characteristics of recurrent ophthalmia. The iris usually appears swollen or edematous. The edema may be severe enough to make the iris immobile. If the iris can be sufficiently dilated by the use of atropine or homatropine, and if the aqueous humor remains clear enough to permit visualization of the lens with an

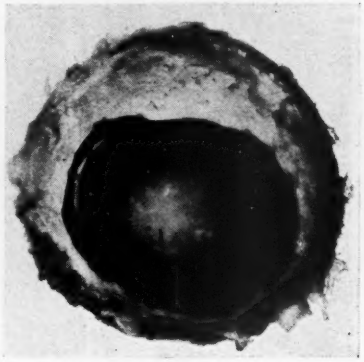


Fig. 1. Typical cataract seen in cases of advanced recurrent ophthalmia.

ophthalmoscope or by illumination from one side, one notes that the capsule of the lens appears thickened and wrinkled. If the fundus can be seen, one should look carefully for subretinal hemorrhages or inflammatory exudate. Either of these may cause detachment of the retina. If the latter occurs the retina will bulge into the fundus. This usually is a serious lesion. If the lesions in the eye are not too extensive, they may disappear and leave the eye apparently normal. However, a severe attack generally causes some shrinkage or atrophy of the eyeball and structures in the orbit. The eye is then retracted further than normal into the orbit, which causes an increase in the angle of the upper eyelid. This is a lesion that commonly was looked for by old experienced horsemen.

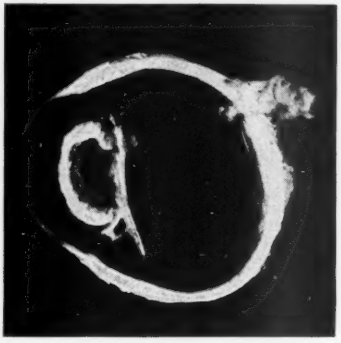


Fig. 2. Cross section of an eye in a case of recurrent ophthalmia, showing chronic destructive lesions; the fundus contained noncoagulable material; the lens has been absorbed and only the capsule remains; the retina has been pushed forward against the lens.

The gross pathologic changes caused by recurrent ophthalmia may vary greatly. They may be slight or marked, depending on the severity of the attack and the duration of the disease. Slight lesions usually consist of small quantities of unabsorbed exudate in the ventral portion of the anterior chamber and adhesions of the iris to the capsule of the lens (posterior synechia). The adherent iris may break loose and leave small bits of itself on the lens. These can be seen with the ophthalmoscope or by transillumination of the lens. The iris should be well dilated to facilitate this examination.

Cataracts are the most common marked lesion observed (Fig. 1). They may be capsular or lenticular; usually both the capsule and the lens are affected. Occasionally one sees a false cataract which consists of a thin layer of exudate forming a diaphragm over the opening in the iris. This, however, is infrequent. If the cataract is extensive, the lens may liquify and be absorbed (Fig. 2). This causes the cataract to have a wrinkled or puckered appearance. It may even project through the pupil (Fig. 3). It has been my observation that a cataract which results from an attack of recurrent ophthalmia, regardless of how slight it may be, usually is associated with severe destructive lesions in the fundus (Figs. 4, 5). Therefore, removal of the cataract would not effect a cure.

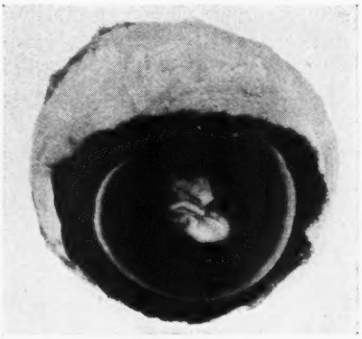


Fig. 3. A capsular cataract projecting through the iris.

Extensive annular adhesions of the iris to the anterior surface of the lens, detachment and atrophy of the retina, and anterior or posterior prolapse of the lens are other frequent lesions. However, these lesions usually are associated with cataract and various degrees of atrophy of the eyeball. Atrophy of the eyeball usually is very slight if the lens becomes detached and prolapses posteriorly early in the attack. If one is not aware of this, the condition may go unrecognized.

The principal microscopic lesions observed are thrombosis of vessels, lymphatic infiltration and various degrees of degeneration and atrophy of the vascular structures, retina and optic nerve (Fig. 6). Lymphatic

infiltration and degeneration also are observed in the cornea and sclera of some eyes.

Treatment*

Because of the frequent occurrence of spontaneous recovery and the difficulty of properly controlling experiments involving the treatment of recurrent ophthalmia, the correct evaluation of any treatment is difficult. Numerous specific treatments have been tried and recommended. However, after a study of the etiology and pathology of this disease one is impressed by the fact that the success of any treatment depends largely on the duration of the disease and the lesions present at the time treatment is first instituted. Certain lesions, such as dense annular posterior synechia, cataract, luxation of the lens, detachment and atrophy of the retina and degenerative changes in the optic nerve, cannot be treated successfully by any method. They are definitely incurable, and attempts at treatment are inadvisable. Some methods of treatment have been shown to be beneficial if they are properly used and if the condition is still curable, but unfortunately they have fallen into disuse because they do not perform miracles and cure an incurable condition.

Fig. 4. A cross section of an eye in a case of recurrent ophthalmia; the fundus is filled with coagulated exudate. One may note that the lens is detached and has prolapsed forward into the anterior chamber.

It is interesting to note that rest in darkened stalls and the use of iodine and atropine have long been considered beneficial in the treatment of recurrent ophthalmia. Law [5] said that during a first attack young horses have been successfully treated by administering potassium iodide internally and by applying cold compresses of a 3% solution of this drug over the eye. In severe cases rest in a darkened stall is advised. He also recommended the instillation into the conjunctival sac of a solution containing 2% of atropine or a solution containing 1% of atropine and 1% of cocaine. The external application of astringent lotions such as those composed of lead and zinc acetate is recommended when local inflammation is severe. Counterirritation, bleeding from the angular artery, puncture of the cornea, and iridectomy were said to be of some value.

Wiggs [6] apparently was the first to inject compound solution of iodine (Lugol's solution) into the supraorbital fat in cases of recurrent opthalmia. He injected 25 to 30 minims (1.6 to 2cc) of this solution. Nine of ten animals treated by him recovered. He also recommended that atrophine be instilled into the conjunctival sac and that the animal be confined to a darkened stable until all inflammation ceases. He expressed the opinion that the disease is infectious. Chambers,[7, 8] Avery [9] and Wilkie [4] all advised the use of Wiggs' treatment with iodine for recurrent ophthalmia of horses, and Chambers also recommended this treatment for keratitis of cattle. Udall, in a discussion of Bolton's [10] paper on Clinical Examination of Animals, said that he has seen good results follow the injection of compound solution of iodine into the supraorbital fat of horses. He also said that he has seen good results follow the use of eye drops composed of atropine.

Woodruff [11] divided all cases of recurrent ophthalmia into three groups: group 1 consists of cases in which an acute inflammatory process is present or is just com-

*Parts of the discussion on treatment are taken from a previous paper on this subject which appeared in the *North Am. Vet.* 14:18-29, 1933.

mencing, and in which permanent injury to the structures of the eye is not apparent; group 2 includes cases in which one or more acute attacks have occurred without apparent structural changes; and group 3 includes cases in which structural changes are present and the optical function is impaired.

Experimentally, it was learned that in the first group the disease responded to treatment, in the second group the condition was less responsive, and in the third group the condition was hopeless. Woodruff injected a solution of mercuric iodide according to the technic recommended by Kelser.[12] Three horses were selected in testing this treatment. They all received 0.5gm of mercuric iodide in 30cc of distilled water, intravenously. This dose was repeated in 48 hours. Only one horse was classified as belonging to group 1. It recovered completely, but the other two failed to recover and had to be killed. Beeman treated nine animals by intravenous injection of 0.5gm of mercuric iodide in 30cc of distilled water. These treatments were repeated two or more times. The animals had had an average of four previous attacks before being treated. One failed to show any improvement, another became totally blind and was killed, and seven recovered and were placed back in service. However, three of these are known to have suffered recurrences. Beeman said that the treatment apparently hastens restoration of diseased eyes to normal but does not prevent recurrence. He further mentioned that exclusion of sunlight, by the use of darkened stalls or eye bandages, and dilation of the pupil with a solution of atropine and cocaine assist materially.

Guard,[14, 15] who was of the opinion that a protozoön may be the cause of recurrent ophthalmia of horses, injected neoarsphenamine intravenously into affected animals. He studied 32 animals; 20 received neoarsphenamine and 12 were used as controls. He could not see any benefit from the treatment.

Bonazzi and Merillat[16] said that the treatment of affected horses should include dilation of the pupil with atropine, evacuation of the anterior chamber, and the feeding of minerals such as coal slack, carbonate of lime, phosphate of lime and bicarbonate of potassium, together with red clover or alfalfa hay and a grain allowance of corn, oats and bran.

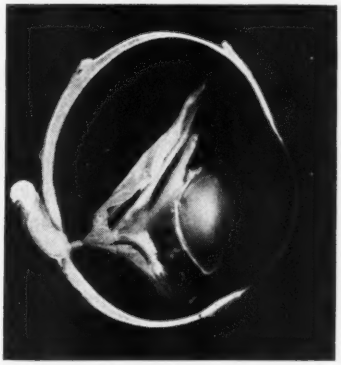


Fig. 5. Detachment of the retina caused by subretinal exudate or hemorrhage.

Rosenow[17, 18, 19] obtained good results with a vaccine which he prepared. He apparently was able to check the inflammatory process and hasten restoration of normal sight in affected animals. An attempt was made to immunize horses against this infection by intracutaneous and subcutaneous injections, and by oral administration of the vaccine. It was thought that this procedure was beneficial in some herds of horses.

Inflammatory diseases of the eyes of human beings frequently are treated by nonspecific protein. At The Mayo Clinic, sterile whole milk and typhoid vaccine are frequently used. Benedict and Rucker,[20] in 1928, presented a brief consideration of the therapeutic effect of foreign proteins. They reported the results obtained with the use of typhoid vaccine, antidiphtheritic serum and sterile milk in 45 cases in which one or both eyes were diseased. They said that milk was most frequently chosen for injection because of the freedom from severe reaction or anaphylaxis. This was injected in doses of 3 to 20cc. The latter dose was employed in only one case; the average dose being approximately 10cc. It was observed that the injection of foreign proteins allayed the pain and caused a feeling of comfort in the eye in the more severe cases. The results

obtained in this series were most encouraging.

In conversation the late Major Beeman related to me his experience with injections of sterile milk in the treatment of recurrent ophthalmia of horses. He injected quantities as large as 20cc at one dose. His results were very good in most instances. The animals that failed to respond to treatment had marked permanent lesions at the time treatment was begun. It is unlikely that any treatment could be of benefit in cases of this type.

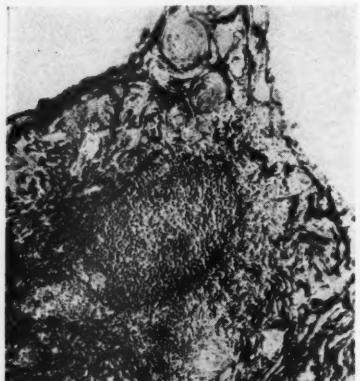


Fig. 6. Large area of lymphocytic infiltration in the ciliary body.

Since posterior synechia is one of the earliest lesions to form in cases of recurrent ophthalmia it is important always to instill atropine into the conjunctival sac to dilate the pupil if possible and thus prevent the occurrence of this lesion. The eye must then be protected from strong light, as the physiological activity of the iris is destroyed so that it cannot govern the amount of light which enters the pupil, and light is irritating to an inflamed eye. I have used both sterile milk and the vaccine prepared by Rosenow, in a large series of cases, with good results in many instances.

On one large estate, comprising eight farms on which are maintained more than 150 horses, recurrent ophthalmia was known to have occurred each year for more than 10 years. In 1929 all the affected horses were treated with a vaccine prepared by Rosenow. Recurrences have not been noted, and no new instances of the disease have been observed in this herd since they were treated. As there was no change made in the diet, the manner of feeding, breed or environment of these horses, there is a strong suggestion that the vaccine was specific for the disease in that herd. Similar results have been noted by other veterinarians.

I also have used sterile milk in many cases. Little if any difference in the curative effect of these two products has been observed. When these agents were used in conjunction with atropine and mydriatics, and when the affected eyes subsequently were protected from light, excellent results were obtained in cases of acute ophthalmia in which there were no permanent lesions. Best results were obtained when the injections were made every 48 to 72 hours. Milk was injected intramuscularly in doses of 5, 10, 15 and 20cc. A maximal effect was generally observed at the third and fourth injections. This, too, has been observed by Benedict among human patients. In clinical practice, if a patient fails to respond to the administration of sterile milk, typhoid vaccine or diphtheria antitoxin is tried, or *vice versa*. Good results frequently follow this procedure. Rosenow's vaccine was administered in the following dosage: 3cc were given at the first injection and 5cc at the second injection; thereafter, the dose was increased 1cc at each injection until not more than 10cc were administered at one time.

In my experience, I have found potassium iodide to be a valuable adjunct to other agents in treating any curable lesion of the eye. When large doses are administered much iodine is eliminated in the lacrymal secretions. It may be that this produces a local effect. Undoubtedly, much benefit has been derived from the administration of iodine in cases of recurrent ophthalmia, according to the various methods described.

Because of the suspected infectious origin of recurrent ophthalmia, it would seem advisable always to isolate the affected animals

until all active symptoms of the disease have disappeared. The stall in which the animal originally was kept should be thoroughly cleansed and disinfected before it is used again.

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General Purpose Liniment

Into a gallon bottle pour one pint of lukewarm water containing two ounces of stronger ammonia. Add another pint of warm water to which has been added two ounces oleic acid, and shake the bottle well.

In a pint graduate, dissolve four ounces ammonium chloride in warm water, and pour this into the bottle, again shaking well. Add a dram of red aqueous color.

Pour four ounces methyl salicylate into the pint graduate, and add twelve ounces of turpentine, colored pink with red oil color. Pour this into the bottle, adding enough warm water to fill it. Shake well, and set in a warm place, such as the kitchen, for a week to "ripen". It will then be found to be a creamy pinkish-colored liniment, with a pleasing odor, useful for many conditions, such as bruises, sprains, mastitis, distemper in colts, shoulder galls, sore necks, and purpura.

* * * *

"Good green, rapidly growing pastures develop and maintain horses and mules at low cost,—and this enables wise farmers to lower their crop production costs."

* * * *

Horses and mules may be displaced with mechanized equipment on large ranches, but it will be a long time before the small farmer can do without them.

* * * *

There were 6,812,350 farms in the United States, with a total area of 1,902,216,540 acres, with an average of 155 acres to each farm. These range in size from the small 63-acre farm in Massachusetts to the huge 1511-acre stock ranch in Wyoming.

* * * *

In our country (the Pacific northwest) horses have been gradually coming back. Ranchers who sold off all their horses and mules a few years ago, now have from four to a dozen good horses on the farm again. They have found horses or mules indispensable for seeding grain, and other kinds of light work. Sandy soil soon wears out the bearings of tractors, and their replacement means a heavy financial burden. For this reason, more colts are being raised than for some years past.

Diseases of the Foot of the Horse

By GEORGE R. FOWLER, Ames, Iowa

THE anatomy and physiology of the foot of the horse are such that the organ is well protected from many conditions that attack other structures of the body, but at the same time they make more severe any inflammatory conditions that do arise. The foot is constantly in contact with the ground, and therefore exposed continually to soil or manure-borne infections. Any wounds of the foot are thus sure to become seriously infected either by the object causing the wound, or subsequently from the highly infected surroundings. In addition, the foot is exposed to bruising from contact with objects of all kinds, and even from the impact of the weight of the animal upon a smooth surface. This is especially common in horses that travel at speed.

The hoof is constantly growing and wearing away. If these processes do not keep pace with each other, trouble ensues. If the growth exceeds the wear we find such conditions as elongated walls that break at the sole margin and split upwards, exposing the sensitive tissues to contamination and injury and if this does not occur we may have unbalancing of the hoof which throws a serious strain upon structures of the leg. If wear exceeds the growth we have undue pressure upon the inner tissues from the road surface and the horse becomes tender footed and even seriously lame. To prevent excessive wear shoes are placed upon the hoof, which in turn may set up a chain of troubles due to interference with the normal contraction and expansion of the wall and reduction of frog pressure.

When inflammation from any cause arises in the hoof we find a serious condition, due to a peculiar anatomical arrangement found nowhere else in the body. The bones of the foot are closely covered with a high vascular and sensitive membrane, the corium or pododerm. This in turn is surrounded by an unyielding structure, the horny box of the hoof. If inflammation occurs in the corium, the resulting inflammatory edema puts great pressure upon the membrane, which is further increased by the presence of the exudate. The result is excruciating pain, and a tendency toward necrosis. For the exudate to escape it must progress upwards above the hoof head, a process which takes time and is only partially successful in relieving pressure, as it has to work against gravity.

Also within the hoof we have two synovial structures that may be entered by a penetrating foreign body. These are the bursa podotrochlearis, between the distal sesamoid bone and the deep flexor tendon, and the coffin joint formed by the second and third phalanges and the distal sesamoid bone. If infection enters either of these it causes all the serious consequences of infection of a synovial membrane anywhere, complicated by the unyielding nature of the hoof. In consideration of any disease of the foot, either from the standpoint of symptomatology or treatment, these basic principles should be kept in mind.

Suppurative Pododermatitis

One of the commonest conditions encountered in the hoof is suppurative pododermatitis. The etiology is the entrance of infection, usually carried in by a penetrating foreign body, or sometimes through a split or crack of the hoof. The commonest foreign bodies to penetrate the hoof are nails, pieces of wire, sharp glass and splinters of wood. Sometimes these objects remain in the hoof, either entire or broken off. Again, they may pull out when the animal steps off the object, and only the damage remain.

The symptoms vary a great deal, but are so well known we will not go into them in detail. Some points that should be emphasized are that the shoe, if present, must be removed, and a careful search made of the sole and especially the frog, following with a hoof knife any suspected spots until they either disappear, or lead into the interior. One rather common symptom that may be

confusing is a swelling of the flexor tendons above the fetlock. This is an inflammatory edema, and is distinguished from tendinitis by a lack of tenderness and heat.

The prognosis is sometimes difficult. As a rule, if the penetration occurs any place along the outer border of the sole, the prognosis is favorable. There are some complications that might occur in this region, but they are unusual. Once in awhile an extensive fracture of the third phalanx results but this is infrequent. A more common happening is a breaking off of a small piece of the rim of the third phalanx, which results in a sequestrum. If the wound is in or near the frog, a guarded prognosis is in order, for there is a possibility of infection entering the bursa podotrochlearis, or even the joint capsule.

The principles of treatment are the same as with a wound any place. The first requisite is adequate drainage, and then protection and rest of the part until healing has occurred. Punctures in the sole are opened up with a funnel shaped hole that there may be a free escape of pus. All underrun horn should be removed. Tincture of iodine or some equally effective antiseptic is applied, and a pack of cotton, saturated with the antiseptic, placed in the opening. This pack should be tight enough to prevent entrance of additional infection but not so tight that it puts much pressure upon the painful sensitive parts underneath. A good way to hold this pack in place is to drive a horse shoe nail through the edge of the sole into the wall of the hoof. About two-thirds of the nail is left projecting. This is bent down upon the pack, holding it in place. The nail may be straightened out with a pair of pliers, the pack replaced, and the nail bent back again. In larger openings, two nails may be used. The foot may be bandaged with muslin, or protected with a boot made of gunny sacking.

A still better way of protecting the foot where the services of a blacksmith are available is to have a shoe made with a detachable plate of sheet iron on the bottom. This is held in place by two set screws which pass through holes in the plate and screw into the ends of the branches of the shoe. A small projection on the front end of the plate passes into a hole drilled into the front calk of the shoe. This plate may be removed, the dressing changed and the plate replaced. By this means the horse may be worked much sooner than otherwise, as the sole is perfectly protected from injury.

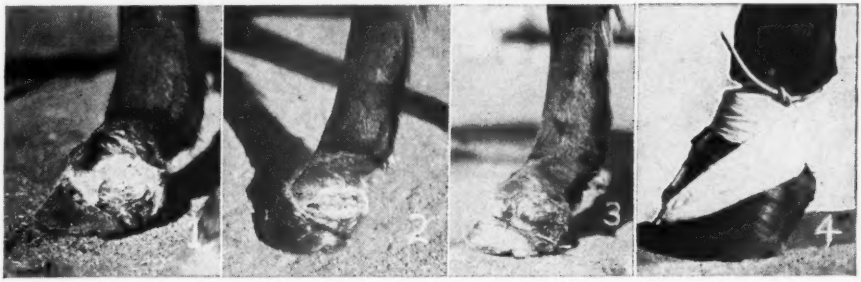


Fig. 1. Old wire cut and quittor. Fig. 2. Same foot ten days after it was operated upon; the wound is well filled with granulations. Fig. 3. Same, three weeks after the operation; no further dressing required. Fig. 4. Quittor bandage; several more turns will be taken after the tourniquet is removed.

Gravel

In some cases the infection travels upwards and breaks out above the hoof head. This is the "gravel" of the horseman. In this condition a careful search should be made of the sole to find where the infection entered. When this is discovered, and the opening enlarged, it is possible to irrigate through from the upper opening, which should be done several times until the infection is conquered.

Fractures

If a sequester has resulted from breaking off of a small piece of the rim of the

third phalanx, the drainage opening made at the site of the puncture will continue to discharge pus, frequently a flat white in color, and sometimes of a distinctly carious odor. When this occurs, the opening in the

Fig. 5. Opening of the bursa podotrochlearis (in center).

sole should be enlarged, and the sequester removed with forceps.

A larger fracture of the third phalanx is indicated by continued lameness, and a long continued discharge of pus. Sometimes the discharge ceases, and the lameness becomes better, only to recur in a short time. The x-ray is the only certain method of diagnosis. Treatment consists of absolute rest, even placing the entire foot and fetlock in a plaster cast. Many of these cases terminate in a complete cure but require considerable time, sometimes two to three months.

Bursitis

If the wound is in the frog, and in the right direction, puncture of the bursa podotrochlearis may happen. This is indicated by continuance of severe pain, fever, depression, and loss of appetite. In some cases an escape of synovial fluid is seen from the wound. Drainage of the bursa should be performed at once, for if not, serious trouble ensues. Either the horse develops septicemia and dies, or the case is prolonged for months, fistulæ usually forming at the heel. The operation is not difficult, much of the aftercare can be performed by the owner, and if done in time it is a life saver.

The horse should be given, via the stomach tube, one to two ounces of chloral hydrate, dissolved in two quarts of warm water. After 20 minutes, the horse is cast with the injured leg uppermost. The lateral volar nerve is blocked with 5cc of 2% procaine, an inch above the fetlock joint. The horse is then rolled over so the affected leg is down and the medial volar nerve is blocked in a similar manner. The leg is then bound by sash cord or web straps to a long piece of two by four or two by six board placed under the leg as far as the body, and extending several feet beyond the foot. The outer end may be held by an assistant, thus securely holding the foot. The foot should be thoroughly cleaned using 1 to 1000 mercury bichloride and a rubber tourniquet should be placed around the fetlock. The point of the frog is grasped by a heavy forceps and an incision made on each side of the frog. Here a transverse incision is made through the frog, joining the ends of the two lateral incisions. By pulling up on the forceps attached to the point of the frog and cutting underneath with the knife, the anterior three-fourths of the frog is removed. The fibrous, or so-called fatty, frog is now exposed, and this is removed down to the tendon of the deep digital flexor. The fibrous frog is closely attached to this tendon, so care must be used to avoid cutting too deeply. The tendon can be recognized by its longitudinal tendon fibers. When the tendon is exposed, a window is cut in it, opening up the bursa for drainage. This window should be about an inch from side to side, and half an inch from front to back. In rare cases the navicular bone, which is now exposed, is seen to be necrotic, or fractured, or sometimes lying loose. If so, all necrotic areas should be curetted, and any fragments or loose pieces removed.

The wound is now treated with an antiseptic and a pack of gauze tightly applied

to control hemorrhage. The foot is bandaged with muslin to keep the pack in place. This pack is left in place for two days.

The aftercare consists of changing the pack daily, after the second day, and applying some efficient antiseptic. The method we have found especially satisfactory is as follows: The pack is removed each day and the foot placed in a strong bucket containing: water, 1 gallon; phenol, 2 drams; formalin, 3 drams. The foot is soaked in this solution one hour daily. The water should be warmed to about 110°F.

A stock solution is dispensed to the owner containing: water, 6 oz.; phenol 4 oz; formalin, 6 oz. One ounce of this to a gallon of water gives the correct concentration for use. This solution was first suggested, we believe, by Dr. T. H. Ferguson of Wisconsin, and has been found to be extremely useful in all wounds of the foot.

After each soaking, a gauze pack is placed in the cavity, covered with the following antiseptic:

Bismuth subnitrate	1 part
Iodoform	2 parts
Mineral oil	20 parts

Shake well before using.

This is a variation of the bipp of war times, but diluted until its cost is reasonable. Only a small amount of this antiseptic is necessary to keep down infection and prevent the action of saprophytic bacteria. After about two weeks, the soaking may be discontinued and the gauze packs only used. The shoe with the detachable plate is very handy from now on. About two to three months time is usually necessary before the horse can be put to work.

In all wounds about the foot, 1500 units of tetanus antitoxin should be used. Making this a routine procedure may save considerable trouble and embarrassment.

Quittor

Quittor, or necrosis of the lateral cartilage of the third phalanx, is frequently encountered. The methods of treating this have not been very satisfactory in the past. The injection method by which some escharotic was injected into the fistulous tracts was dangerous and many times ineffectual. The operations used were quite difficult and many were more theoretical than practical. During the World War a French army veterinarian (Perrier) developed a really practical operation for quittor, one that can be performed by any veterinarian and that has given us a very satisfactory percentage of cures.

Fig. 6. Cotton pack held in place by a bent horseshoe nail.

Years ago most quittors were caused by calk wounds. Here we found a comparatively small wound with the cartilage infected below. Today the great majority of quittors are caused by wire cuts, with the cartilage widely necrosed. This is complicated by a large amount of scar tissue around and above the cartilage, many times hyperplastic and infected. This makes a condition very difficult to handle by the older means but lending itself quite well to Perrier's method.

The hair from the coronary band to the fetlock should be clipped and preferably shaved. The hoof is thoroughly cleaned of all dirt and scrubbed with a brush and mercury bichloride 1-1000. A pack of cotton is then placed all around the foot, including the sole, and held in place with muslin bandages. This pack is kept soaked

with mercury bichloride 1-1000, for 48 hours. A quart of the solution and a rubber syringe are given to the owner with instructions to keep the pack moist by applying some of the solution to the top of the pack every few hours. The purpose of this is to eliminate as far as possible any pathogenic organisms around the site of operation. If this is not done a wide spread septic inflammation of the soft tissues around the coronary region may follow the operation.

The horse is given one to two ounces of chloral hydrate in two quarts of water by the stomach tube. He is cast with the quittor upwards, and the leg and foot held by lashing to a 2x4 or 2x6 plank as previously described. The digital nerve is blocked

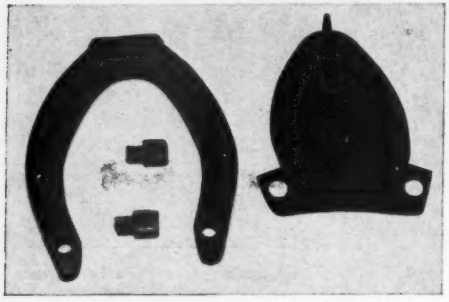


Fig. 7. Horseshoe with detachable plate.

with 2% procaine over the fetlock, where it can be palpated underneath the skin. Tincture of iodine is applied to the coronary region and a tourniquet applied tightly around the pastern. Sometimes in extensive scar formation of the old wire cut, the tourniquet has to be applied above the fetlock, but it is more effective in controlling hemorrhage if it can be placed below.

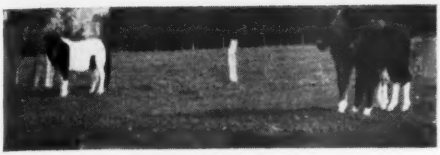
An incision is made through the skin just above the coronary band, long enough to extend from end to end of the old scar. Beginning at one end of this incision another curved incision is made extending up over the scar and joining the other end of the first incision. The skin between these incisions, including all of the old scar possible, is removed down to the lateral cartilage which is now exposed. All necrotic cartilage is removed, working from the outside, using a scalpel and curette. The cartilage is followed down as far as necessary, many times an inch or more below the coronary band. It is important to remove

Fig. 8. The shoe shown in Fig. 7, assembled.

as much of the old scar as possible, and all necrotic cartilage. Care must be exercised, in paring away the cartilage, not to invade the joint capsule if the cartilage must be entirely cut through. This is avoided more surely if the foot is kept extended. No effort is made to provide bottom drainage for the wound cavity.

After removal of all necrotic tissue the wound is tightly packed with gauze containing the mineral oil, bismuth and iodoform mixture described previously, and securely bandaged with muslin. A horse shoe nail may be driven part way into the toe and then bent to form a hook and several wraps of the bandage passed under it, to hold the bandage in place.

After treatment consists in changing the bandage daily, and if possible in soaking the entire foot in the phenol and formalin solution. In a surprisingly short time the wound cavity fills up with granulations from the bottom and healing is complete in three to four weeks. In some cases a thickening or "lipping" of the coronary region follows this operation but it has never in our experience caused more than a slight blemish.



Isaac and Jake
These midget mules have the dignity of a ton horse.

Midget Mules

Midget mules are a cross between a Catalina jack and a Shetland mare. They have all the characteristics of the mule; are very active; and, if their training is started young, learn very easily.

After three years of experimental work, we now have three midgets, which we call Esau, Isau and Rachel. Isau was the largest at birth, weighing 40 pounds, and standing 28 inches in height. Rachel weighed only 24 pounds at birth. Last year we had another tiny mule, called Cinderella, which liked ice cream and would drink pop from a bottle. It became a great pet before it was sold to a bush league baseball team.

Dr. Bradley and Esau.
Showing the comparative size of a midget mule and a man.

Midget Mules
Dr. Bradley holds Esau in his arms.

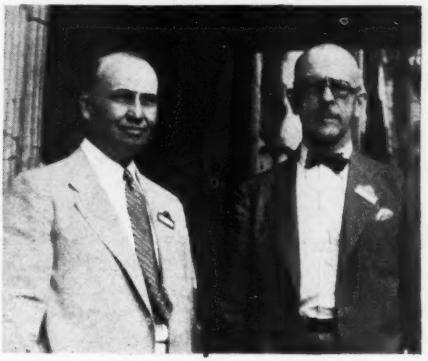
In color, one was solid, and four had white feet and legs.

A full grown midget will probably weigh around 350 to 400 pounds.

They are especially suitable for children's pets, combining the docility of the Shetland with the sagacity of the burro.

A Prolific Writer

Dr. J. P. Foster, well known veterinarian of Minneapolis, Minnesota, is the author of a very interesting series of articles in "The Thoroughbred Record", published at Lexington, Kentucky, and devoted to the interests of the light horse.



J. P. Hulton, J. P. Foster
When they get together the subject discussed is horses.

Among the two dozen or so discussions appearing during the past year, Dr. Foster has treated on Conformation; Navel-ill; Periodic Ophthalmia; Roaring; Umbilical Hernia; Bog Spavin; Management of Brood Mares; Life's Span; Commentaries; Sex Determination; Some Thoughts on Breeding; Navicular Disease; Nelson, the Northern King, and Strangles.

In "A Tale of Two Horsemen", Dr. Foster gives an amusing account of two stock owners who had different "idees" on ethics and such. "Random Observations" deals with old-time theories regarding the determination of sex, and contains a lively description of an old stallion keeper.

This type of writing has a tendency to bring before the reader the importance of seeking expert assistance, instead of depending on the self-styled "hoss expert".

Punctured Foot Wounds

By SAMUEL BURROWS,
Shaker Heights, Ohio

We have always believed in the antiseptic treatment of wounds of the feet as in other parts of the body, and for that reason we do not believe in poultices, or soaking in a tub of hot or cold water for foot injuries.

In treating punctured wounds of the sole or frog we first remove the shoe. If the puncture is not visible the area of soreness is located with the hoof tester. We then pare down the whole sole and frog, and if the hoof is long shorten the wall. The sole and frog are cut down until all dead and dirty horn has been removed, leaving the bottom of the foot perfectly clean. We then thin an area three inches in diameter surrounding the wound until it is quite thin. The immediate region of the wound is thinned until small drops of blood appear from the velvety tissue. With a sharp pointed knife held at right angles to the sole we make several incisions in the thin horn from the wound outward for ⅜ of an inch. These ends are then picked up with rat tooth forceps, dissected away from the velvety tissue as far as there is any separation, and cut off. The punctured wound is thus clearly exposed to view, and surrounded by a clean area of the sole or frog.

We never probe a nail puncture. At the time, it is a matter of little importance just how far the nail penetrated or what structure is invaded. A fairly good idea can be formed as to the severity of the case by the location of the puncture, and, if one pulls out the nail, by the direction it took. The amount of lameness and the kind of discharge, if any, supply one with additional information as to the severity of the case. The chief object at the first, as well as at subsequent treatments of the wound, is to prevent further infection and promote healing.

In our early years of practice we followed the above plan but also did a lot of washing with various antiseptics, and applied iodoform and tannic acid 1 to 3. We found, however, that this made the horn dry and hard, making it more difficult to keep it thin.

While it gave us good results we decided to discontinue the use of powder and have since used liquid antiseptics. After many were tried we have come to prefer undiluted cresol. The change in character of the horn and of the wound following the use of the liquids was quite noticeable. Instead of making the horn dry and hard and sometimes preventing good drainage as did the powder dressings, the cresol makes it soft and pliable, reducing pressure on the underlying sensitive tissue and making later paring much easier.

After thinning the sole and frog a dressing is applied. We seldom wash the wound with an antiseptic before applying the dressing, but wipe the parts with clean cotton. We take a pad of absorbent cotton large enough to fill the bottom of the foot, then pour on the wound one-half ounce or more of pure cresol, sufficient to saturate the cotton directly over the wound. This is covered with a piece of leather cut to fit the contour of the foot, or a piece of inner tube, thick cardboard, or several layers of paper, to prevent moisture reaching the dressing from below. This in turn is covered with burlap or a grain sack in the manner described later.

We change the dressing once daily and if there is only a little discharge we wipe it off with dry cotton. If there is a copious discharge it is washed off with a warm antiseptic and the dressing renewed as before.

We like to treat these cases ourselves the first few days so the attendant can see how it is done and thus be better able to do a good job when the time comes for him to take care of the case himself. This we consider of great importance because without that careful daily care we cannot always hope for a successful termination.

As the horn is constantly growing it is necessary to thin it every few days until healing is complete. There is more or less

separation of the horn for several days; this we cut away as at the first dressing. Also a small mass of tissue of the size of a pea frequently appears at the entrance of the puncture; this we always cut away with one quick stroke of a sharp hoof knife. The dressing is repeated daily until complete healing has taken place and there is an entire absence of lameness.

After the recovery of severe cases we advise not working the horse for several more days, and have a thin piece of iron welded across the ground surface of the shoe and covering the nail puncture to protect the part from bruising.

The foregoing treatment applies only to those cases that are curable without an operation. Where it is carried out faithfully the percentage of cases really requiring an operation is exceedingly small. We operate when we find it necessary, but never let an extremely lame horse or a very nervous owner make us believe that an immediate operation should be performed.

It should be emphasized that it is much easier to do all the paring of the foot at the first visit than afterward; also that in thinning the sole no attention should be paid to the seat of injury until the job of thinning is complete.

This method of treatment applies equally to nail pricks made by the horseshoer, to suppurating corns, and to all infection within the hoof.

Direct treatment of the wound should not be given entire credit for the successful outcome. A suitable dressing that will keep the foot dry and clean from day to day is of equal importance. In tying up a foot we use a tie that we worked out while a student in college. Take a grain sack of average width and fold over several inches at one end to shorten it according to the size of the foot. Place the bag with the folded end on a level with the fetlock joint. Apply the dressing as described; then fold over the outer edge of the bag, then the inner, and lastly bring the lower end of the bag neatly folded in upward over the bottom of the foot, when if enough of the upper end has been folded over both ends will meet.

To hold it in place take a piece of small rope or extra heavy string from 9 to 11 feet long according to size of the foot. Place the center of the rope against the fetlock, cross the ends in front, bring back, pull very

Grease Heel

This is a genuine case of aggravated grease heel or "grapes," and required nearly three months to bring about an improvement. Bacterins, blood tonics and salicylic acid ointment finally resulted in a cure.

Keloids

This sample of exuberant granulation followed a minor wire cut, after the owner had applied powdered alum, slaked lime, blue vitriol, white arsenic, zinc chloride, several cancer pastes and tried to burn it off. Other than this, nothing had been done when the writer was called. A surgical operation was performed.—*E. T. B.*

tight, and tie a half knot. Now bring both pieces down and tie another half knot below the bulb of the heel; again carry both pieces down to within two inches of the toe, tie another half knot, pass an end over each side of the foot, cross in front, then come back and pass each side rope through the lower loop and pull each rope outward as tight as possible, now cross in front again and carry them up to the fetlock and pass around and tie tightly with a bow knot. This will not come off except from biting or stepping on it with a sharp calked shoe of the opposite foot.

Calk Wounds

In the treatment of calk wounds we have followed somewhat the same line of treatment as described for nail punctures and believe continued success with all kinds of calk wounds can only be had by the use of antiseptics.

To begin with we have the opposite shoe pulled off, leaving the shoe on the injured foot to use the branches to help retain the bandage in place. Next, we clip the long hair from over a good sized area and proceed to remove a piece of the wall. We try to estimate about how far the calk passed under the horn by the tears or cracks and the general appearance of the wall at the point of entrance. With the curved end of a sharp hoof knife we cut a circular groove down to the separation of the wall and remove this in one piece. If our calculations have been correct we will have removed all that is undermined or loose; if not, the circle is enlarged until sound horn is reached. This will usually uncover long tufts of hair, which are wiped off with cotton. We don't like to wash such wounds as washing only serves as a carrier of bacteria from the parts above. We prefer to wipe the wound with absorbent cotton and keep the area above dry. If carefully done, the piece of wall can be removed without any noticeable pain to the horse.

We again hold a pad of cotton against the foot and pour in a liberal amount of our chosen antiseptic such as pure cresol and apply a gauze bandage. We change the dressing daily and do not wash the wound unless there is considerable discharge, simply wiping off the surface with dry cotton.

In treating cases of several days standing where infection has already taken place we apply a dressing as above and saturate it several times daily with a warm 10% solution of cresol or other antiseptic.

In treating any hoof infection we never hesitate to cut away all undermined horn.

Typical Melanoma
This was found in a horse about sixteen years of age. Soon after this picture was taken, emaciation became rapid, and the victim was destroyed. This condition had been coming on gradually for years.

Melanoma in Flank
An unusual location for melanotic tumors. Death from generalized melano-sarcomatosis occurred about two months after this was taken.

Middle West Equine Practice

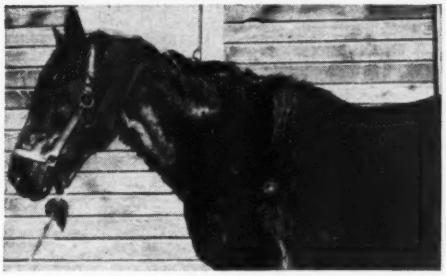
In the 17 years I have been practicing in north central Missouri, I have had a number of cases of tetanus in hogs, sheep, and mules. This disease has been quite prevalent in this locality ever since the Civil war. It was widely prevalent at that time among the soldiers and cavalry horses and army mules, and seems to have become quite well established.

The first clinical symptoms are stiffness, rigid muscles over the lumbar region, twitching of the membrana nicatans, stilted gait, labored respiration when the costal muscles are involved, and distended nostrils.

My method of treatment consists of the following: first, I find the wound, if possible (I have treated a number of cases in which it was impossible to find the wound; I believe the germs sometimes enter the system through abrasions on the mucous membrane. In this locality owners commonly salt their horses and mules on the ground, causing them to pick up and swallow the germs from the ground.)

Next I administer intravenously 100cc relaxans (Pitman-Moore), which contains chloral hydrate 462 grains and magnesium sulphate 386 grains. I follow this immediately with 40,000 to 60,000 units of tetanus antitoxin administered intravenously, the amount depending upon the rapidity and severity of the disease.

These patients, though down, arise immediately. Further treatment consists of bran mashes, oats, legume hay, plenty of fresh drinking water to which is added three to six drams of cannabis daily, depending on size of patient. The patient is allowed, as nearly as possible, its natural environment; the only time it is kept in a stall is when the weather is extremely hot, and the mate is always left with it, or it is allowed to roam in a small pasture to pick bluegrass. The animal should be sprayed well to repel flies. The idea of keeping the patient quiet in a dark stall is unsatisfactory, for my experience is that it responds better in its natural environment. Strong purgatives are contraindicated. In 75% of my cases the seat of infection was a sore neck or sitfast. The treatment consists in removing all dry, dead tissue surgically and



External Parasites
Hog lice sometimes homestead on a horse and enjoy the surroundings. On a warm day, the lice come out to the ends of the hairs and look over the scenery.

mopping or swabbing them with tincture of iodine, then directing the client to cleanse

Internal Parasites
Of the many internal parasites infesting the horse, perhaps the most common are the ascarids. This one was fourteen inches long, and come from a yearling colt following administration of a worm capsule.

the wound twice daily, using cotton and scarlet oil.

This line of treatment is expensive, but the expense is not out of line when a valuable animal can be saved.

JOHN H. WOOLSEY.

Hamilton, Mo.

* * * *

As a general sedative, we have for years used equal parts of chloral hydrate and powdered gum acacia. Fill a No. 10 capsule with this mixture, and then seal the capsule by dampening the ends. In this manner, the capsule will not dissolve in wet or very hot weather.

Cryptorchidism in Horses

By E. E. WEGNER,
Dean and Professor of Surgery,
State College of Washington

CRYPTORCHIDISM is common in the equidae and is called to the attention of the veterinarian more often in this species than in any other. The causes of this condition are obscure and a discussion of them would not be of particular interest. Perhaps it should be said that the testicles normally develop in the sublumbar region and descend through the inguinal canal to the scrotum. Some difference of opinion has been expressed as to the time when the descent should be completed. Observation over a considerable period convinces me that descent is usually complete at the time of birth, although some writers have expressed the belief that descent does not occur until the animal is several months of age. Certainly that has not been the writer's experience.

Horse and mule colts are usually presented for castration at two years of age or younger. Formerly horse raisers preferred to wait until the age of two years but more recently with the earlier maturity of the animals, it has become common to have colts castrated at from 12 to 15 months of age.

Diagnosis.—Monorchadism or cryptorchidism usually is not diagnosed until the animal is presented for operation, or perhaps the owner has attempted the operation himself only to find that the testicle is not in its accustomed place in the scrotum and a search for the organ by palpation through the structures of the part does not reveal it in the inguinal canal. Then the veterinarian is usually called upon for the operation.

Preparation of the Patient.—We recommend that animals presented for operation be prepared by withholding the bulky feed from the ration for at least 24 hours preceding the time of operation. Grain and water may be supplied so that the animal is not inconvenienced in any way; but it is desirable to withhold bulky food to such an extent that the digestive organs within the abdomen are not distended with food at the time of the operation.

Examination of the Patient.—Before operation is begun, the operator should obtain all possible information concerning his patient. The history of the case should reveal what, if any, previous operations have been performed. That is, if the animal has been operated upon previously, has the left or the right testicle been removed and has an effort been made to secure the opposite one? In other words, have two incisions been made and only one organ removed? It is frequently impossible to get reliable information from the owner because he simply does not remember. The operator is left, therefore, to his own devices to determine the side that should be invaded. If only one scar is visible, we assume that the opposite canal has been unopened. If two scars are visible, it is often difficult or impossible to determine from which side the testicle has been removed since both sides contain fibrous tissue. Rectal examination may be helpful as it is usually possible to palpate the structures of the spermatic cord where they disappear at the site of the internal inguinal ring. If the abdominal wall is smooth at the site of the ring and no cord structures can be palpated, it is evidence that the testicle has not descended on that side. Search for the testicle itself by palpation through the rectum is usually disappointing. It is questionable whether the examination is of sufficient value to warrant its being conducted.

Restraint.—It is desirable to confine the patient in the dorsal recumbent position with the hind limbs flexed and moderately abducted. The so-called cross-pelvic tie serves admirably for this purpose.

Preparation of the Field.—The area involved should be cleansed carefully and then painted with tincture of iodine. The hind limbs should be covered with moist towels as a protection from dust particles.

Anesthesia.—Whether or not general anesthesia should be given is a matter for the

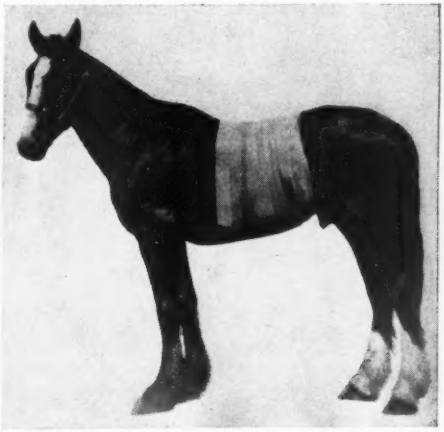
individual operator to decide. In most cases it is desirable to give chloral hydrate in dosages sufficient to bring about semi-consciousness. The animals are more easily handled and offer less resistance during the operative procedure.

Instruments.—Instruments required consist of one scalpel, scissors, emasculator and several pairs of artery forceps. It is also desirable to have a chain ecraseur sterilized and ready if needed.

Operation.—With the animal in the posi-

Cryptorchid Testicle Weighing 14 Pounds
It was removed from the abdomen through a flank incision. The figure at the lower right is a normal testicle.—*W. S. C. Clinic*

tion described above, a twitch should be applied and held securely by an assistant. The incision should be made about two inches to the side of the median line and parallel with it and should extend moderately well forward toward the point of the sheath, as wounds in this location drain better than those made more posteriorly. After the incision is made in the skin, the scalpel is replaced on the tray and the tissues are separated by blunt dissection; with the two first fingers of the hand extended, they are forced into the tissue laterally in the direction of the external inguinal ring. Likewise, the fingers of the other hand are forced in beside them and the tissues are forced apart



Patient from which a 14-pound testicle was removed.
W. S. C. Clinic

until a space sufficiently large to admit the hand is provided. The entire hand is then passed into the opening and into the inguinal canal. At this point a careful search should be made for vestiges of the spermatic cord. This search should be made particularly in the posterior part of the canal. The finding of structures of this sort indicate that the animal has been previously operated upon on that side. Sometimes the full stump of the cord covered by the tunica vaginalis is encountered in which case it is evident that the operator is invading the wrong side. Since the operation has not proceeded to a point where vital organs are involved, it is only necessary to change to the opposite side and proceed as before.

If the inguinal canal is found to be completely empty, the operator should proceed outward and upward, following the space within the inguinal canal until the upper end of this space is reached. At this point effort is made to identify the location of the internal inguinal ring.

In many cases some development has taken place at the site of the inner ring and the spot may be identified by the presence of a rudimentary tunica vaginalis, or it may

be only a special thinness of the wall. If none of these developments have occurred, the wall may be perfectly plain and free from any identifying characteristics. In

Logging Team
Lumber companies still find the big, strong teams indispensable to their work in the woods. This team was six years of age at the time this photograph was taken, weighed 3750, and was purchased for $550. Geldings are preferred in the big woods.

such a case the operator must use his knowledge of the anatomy of the region to determine the point at which to make the opening into the abdomen. Where the location of the internal inguinal ring is marked, one should break through the abdominal wall either directly through the ring or through the muscle external to and above it. The opening is made just sufficiently large to admit the first two fingers into the abdominal cavity, particularly if there is the suggestion of a formation of the tunica vaginalis. Very frequently the epididymus is to be found just inside the abdominal wall and is very easy to withdraw, or even passes into the opening made through the muscle. In such cases it can be grasped without any difficulty and drawn outward into the canal, bringing the testicle with it.

In other cases, it is necessary to introduce two fingers full length and make a search of the area to locate and identify the epididymus which, having been found, can easily be drawn into the opening. The epididymus is recognized by the peculiar character of this organ. When the fingers come in contact with it, it resembles a mass of fine, firm tubules rather loosely bound together. One who is familiar with the anatomy of this organ is not likely to mistake it when once it is touched by the fingers.

In cases where the organ is not found immediately, it may be necessary to search somewhat farther from the abdominal opening but it is seldom necessary to make an opening large enough to admit the hand. One can usually reach posteriorly and may find the gubernaculum testes muscle, in which case this structure is followed up and the organ sought for is brought to the abdominal opening. Otherwise, the fingers may be introduced somewhat farther into

Abdominal fistula (operated upon) from use of the trocar—Photo by Turner.

the opening and search backward in the pelvic cavity toward the neck of the bladder where the vas deferens can be found. This is recognized by the fact that it is a cylindrical tube having a thick, fibrous wall. In fact, it feels like a thick fibrous cord. This can be grasped between the fingers and brought closer to the opening. Traction upon it will draw the testicle into the opening that has been made into the abdominal muscle.

Most operators who have not had experience are usually apprehensive of being unable to locate the testicle. But, as has been truly said, it is usually the operator and not the organ that is lost in cases of failure. The operator who keeps in mind the anatomy of the part and proceeds methodically and carefully will succeed in a very high

percentage of cases. Only in instances in which abnormal conditions occur, will the above methods prove unsuccessful.

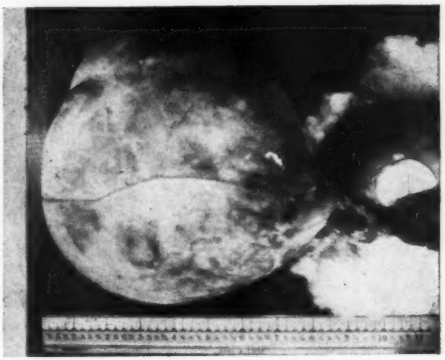
When the testicle is brought into the inguinal canal, it is usually possible to draw it down, even out through the skin incision, and the cord can then be divided with the emasculator. In certain cases the cord is very short and the chain ecraseur may have to be used to divide the cord far up in the canal.

Post-operative Treatment.—In ordinary cases where no unusual difficulties have been encountered and where the opening through the abdominal muscles is just sufficiently large to permit the organ to pass out, we handle such cases post-operatively as normal castrations. We release the animal and do not suture the wound nor pack the canal. Uneventful recoveries should follow. It is desirable for these animals to have exercise twice daily and we recommend that they be walked for an hour in the morning and again in the afternoon. The exercise causes some activity in the muscles of the region, promotes good drainage, and usually prevents excessive swelling.

In certain instances where some difficulties have been encountered and the opening through the abdominal wall is larger than intended because the hand has been crowded into the opening and the muscle has spread in a downward direction, it is desirable to protect the animal from prolapse of the bowel by securely suturing the skin incision. After this is done, if an internal organ should pass out through the opening in the abdominal muscle, it could not escape through the skin incision; it could not become infected or injured; and replacement would be reasonably easy. Animals being handled in this way should be kept on their feet and should stand quietly in the stall for eighteen hours; after which, if there has been no prolapse, the swelling is sufficient to quite completely close the opening in the abdominal wall and the inguinal canal and the danger of prolapse is past. The sutures in the skin should then be removed and the lower part of the canal opened for drainage. Further post-operative treatment is usually not required.

Space does not permit a discussion of the many abnormal conditions that may be encountered, but one should keep in mind that the percentage of unusual cases is small and that the majority of cases offer no unusual difficulties. In our experience here on one occasion an abdominal testicle weighing fourteen pounds was found which could not be removed through the natural channel but had to be removed through a large incision in the flank.

Just recently a large cystic testicle was



Cystic Testicle from a Horse
The cyst contained seven pints of fluid, which was removed by means of a horse trocar and canula. The collapsed organ was removed through the inguinal canal without difficulty.—*W. S. C. Clinic.*

encountered, the cyst holding about seven pints. In this case the organ was drawn up to the opening into the abdominal wall by the aid of an assistant who lifted the organ with one hand in the rectum. In this position the cyst was punctured by the trocar and the fluid evacuated, after which the cyst collapsed and the organ came through the small abdominal opening. Other abnormalities have been observed, but tumefaction and cystic degeneration are the most common. Most of the enlarged organs can be brought down through the usual channel and it is seldom necessary to operate through the wall of the abdomen at other points.

* * * *

For a local anesthetic in removing collar galls, crazy sore neck "cores," and other growths on horses, we still prefer quinine and urea hydrochloride.

Operation for the Relief of Roaring

By T. A. SIGLER, Greencastle, Indiana

The operation for the relief of roaring is performed in both the standing and recumbent positions. Whatever method is used, the mucous membrane must be stripped from the ventricle as completely as possible.

When this operation was first performed, most animals were cast, chloroformed, and placed in dorsal position. Various mechanical methods of removing the membrane were practiced until Blattenburg invented the burr. Some still prefer to use forceps, grasping the membrane and pulling it from the ventricle with a lifting motion.

This is an operation requiring skill and practice. I operate both in the standing and recumbent positions. I have operated on such cases without any restraint whatever, other than thorough anesthetization. After all, the dentist does not anesthetize us and ask us to remain standing while he pulls a tooth. It is so easy to put a little chloral hydrate solution into the jugular vein sufficient to drop the animal. If the seat of the operation can be locally anesthetized at the time of tubing and sufficient solution used to put the animal off his feet, he goes down quietly, if not completely out. I fasten the legs with a set of chain hopples, such as is used by the Michigan State College. With this apparatus, the animal need not be put completely out, and he is up in a few minutes after the operation. These hopples are similar to the English hopple. A good cheap hopple can be made with four loops plaited in iron rings, and rubber hose or old bicycle tires slipped over the loops. They can be looped over the feet and pulled together and a half hitch taken over one foot. This serves well.

Instruments Used

The Robinson operating knife, a slightly curved short cutting blade, slightly corrugated on the shank and ground back a little on the shank, makes a desirable knife for opening up the wound and cutting the thyroid ligament in the center in the standing operation. For the recumbent operation, I like the Adams' pattern, which I had made over a few years ago, larger and heavier than the original Adams. The ventricular injector to slip on a syringe is fine for the standing operation as well as for those that are down. When the animal is not completely anesthetized, the mucous membrane can be sprayed with butyn or cocaine. These instruments were made by Haver & Glover. I also have a short curved forceps that works over the burr. It is very fine in the standing position. Whatever forceps used must be of a kind that will not slip, but will retain the membrane once it is grasped. I use the Blattenburg burr. Burrs, like emasculators, must be made to do the work properly—not too harsh and tear the membrane, yet holding it, once it is entangled, until the forceps is locked into it.

I use a trachea tube of a pattern brought out by Jen-Sal the past summer and it works fine. Mutilation of the cartilage in the trachea should be avoided. Many times a thickening in the trachea results from using a trachea tube that is too large and causes a chondritis resulting in stenosis. This may be responsible for only a partial recovery and a lot of trouble later.

The operation should be performed in mature horses whenever possible; however, I have seen very young roarers, having operated on a weanling colt at one of the state meetings two years ago.

In performing the operation, care should be taken not to injure the larynx in lifting the membrane. When the condition is complicated by chondritis of long standing, the cartilage involved is increased in size and rigidity. Such cases can usually be diagnosed by palpating the larynx in addition to exercising the animal.

After the larynx has been opened, the burr should be introduced to the bottom of the ventricle and twisted until it entangles the membrane. It should be lifted gently with a prying motion over the side of the wound, as it will not tear out so easily in

this way as from pulling straight up. As soon as the entangled membrane is lifted sufficiently, grasp it with the forceps, and remove it in its entirety. The membrane should then be straightened out before it is excised. If it is cut off at the mouth of the ventricle while twisted it will leave jagged edges and the stripping will not be complete. The membrane should be worked off to the very edge of the cords.

After the operation, the animal should be kept quiet for about two weeks and should not be put to heavy work for six months.

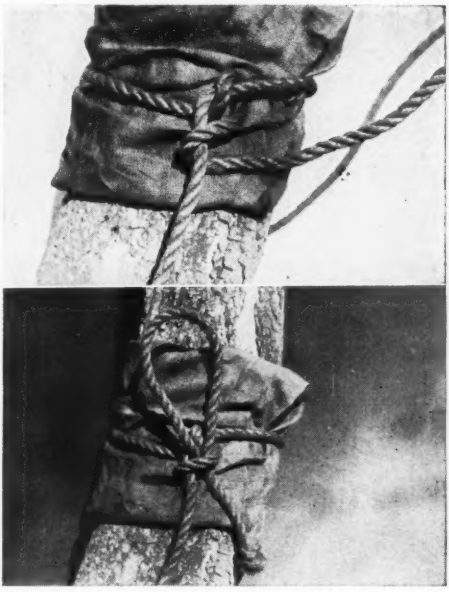
* * * *

Castration of the Horse

A great deal has been said and written about castration, both in standing and recumbent positions. In unbroken horses, especially the range horse found in the west, it is first necessary to catch the horse, snub him up to a post and forcibly restrain him. In the cornbelt also, many colts are not broken until they are ready to work, at two and three years old and their restraint becomes a real problem. Many times a good, wiry heavy draft yearling can thump one around like a stepchild.

With such an animal, I use two lariats, one to lasso and snub him up to a manger or post, the other to make a war bridle. If this contraption is properly applied, it is seldom necessary to use a twitch; the ordinary horse can usually be handled with one hand. It is then an easy matter to apply the hopples or the throwing harness.

In the last few years I have discarded



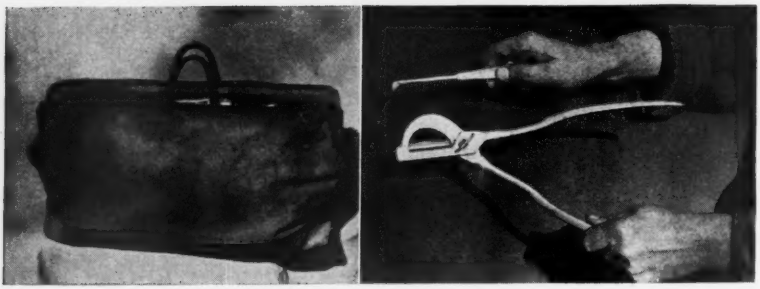
Protecting Our Halter Rope
To prevent sharp edges of wood or bark cutting the halter rope, we usually wrap a burlap sack around the tree or post. The illustration shows the method of tying, so it can be jerked loose in an emergency.

the traditional throwing harness, using instead a half-inch rope in the manner described by Dr. Merillat at one of the meet-

A Necessary Halter and a Handy, Efficient Twitch

A halter, one that the most powerful horse cannot break, is necessary for the safety of the patient and veterinarian. Using two holes in an old buggy spoke, and a large sash cord, makes a good twitch. Holding this back toward the ears it will not slip off at a critical moment.

A Castrating Outfit



A bag for carrying the casting harness and halter and two good instruments for equine castration — a safety emasculator and a stiff-handled, hoe-blade knife. With a twitch and an enameled basin the outfit is complete.

ings a few years ago. The rope is doubled, thrown around the neck, and tied in a bowline knot to form a collar. The knot is placed on the back where the saddle rests. The collar is tied so that it hangs low on the breast. The rope is then carried down around the hind legs and back up through the collar.

It is preferable to throw all unbroken horses. In ridgelings, a little chloral in the jugular makes tying them up easier, and permits the operation to be performed without much pain to the animal. The classic way of castrating the normal horse, especially old stallions and large animals we do not care to throw, is to inject a solution of procaine into the inguinal canal and the testicular cords, waiting ten minutes before operating.

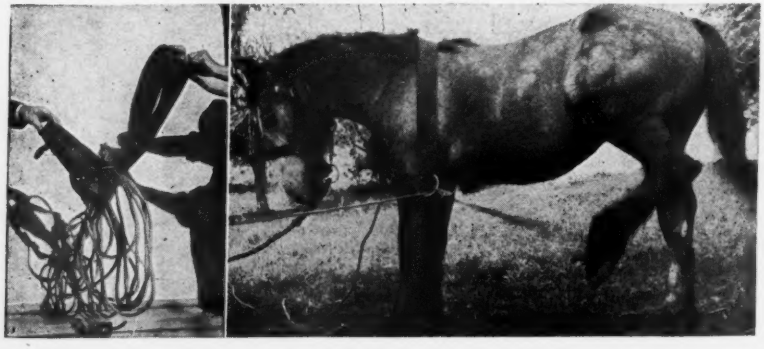
It is better to cast all mules for castration, as when they are in the recumbent position it is possible to remove an inch or more of the tunic, in order to prevent hydroceles, known as "water seed" or "water bag."

For mule castration, I like a good sloping hook castrating knife and a large, long-handled emasculator, such as Baker illustrated a few years ago. For cryptorchids and short cords, the ecraseur is satisfactory.

Colt Ready For Operation
On left side, with a double-half hitch around the upper hock, there is no danger of animal kicking or disturbing operator. We use about ten minutes to adjust harness; throw colt and operate on it, in uncomplicated cases.

T. A. SIGLER.

Greencastle, Ind.



Casting Harness, Off and On
To throw the animal on the left side, we raise the left hind foot first, so that it loses balance and falls toward that side.

Operations on the Tail

Subcutaneous Caudal Myotomy

By T. A. SIGLER, Greencastle, Indiana

The cross section of the tail of the horse shows the chain of coccygeal bones surrounded by six muscles, two superior, elevators, two inferior, depressors, and two lateral, curvators. All are long, tapering muscles inserted into bones as they pass to the extremities of the tail. These muscles are covered by a heavy fascia and this, in turn, by a heavy, tough skin. The vessels are the dorso-lateral coccygeal vessels and nerves which lie next to the vertebrae on the deep face of the lateral coccygeus muscle; the ventro-lateral coccygeal artery and nerve which lie next to the vertebræ between the intertransversalis muscle and the sacro-coccygeus ventralis muscle, and the middle coccygeal artery and vein which lie between the two sacro-coccygeus ventralis muscles exactly on the median line.

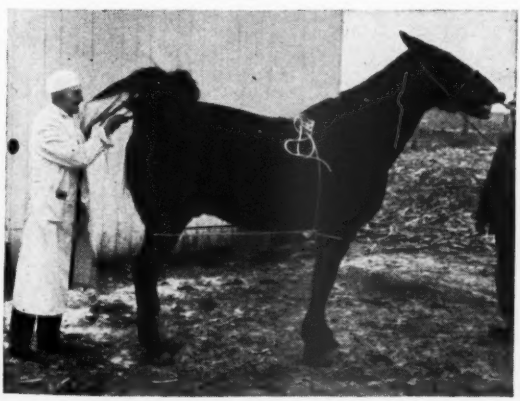
Subcutaneous caudal myotomy is indicated for the correction of curvature of the tail and for setting up the tails of show horses. The operation, vulgarly known as "nicking", is to allow the tail to be carried higher to improve the appearance of the animal. The operation is best performed in the standing position with the use of local anesthesia.

The twitch is applied and the hood placed over the animal's eyes. A set of good service or breeding hopples are placed on the animal, where there are no stocks at hand. In lieu of these, a lariat may be passed around the hips above the hock, between the forelegs, under the rope on the side, brought over the back, and tied near where the saddle rests (see illustration). This is also a fine restraint in dental operations, when horses are inclined to strike, as this method prevents their throwing the forelegs and striking the operator.

T. A. Sigler

The instruments used for tail setting and straightening of the tail are as follows: the ordinary nicking knife or a Mead's abscess knife, with the point ground off and the heel of the knife cut down to the same width all the way through; a hypodermic syringe, 8 or 10cc (I like a good strong syringe for this work); a small hypodermic needle, from about 19 to 23 or 24-gauge, one-half inch long for anesthetizing the outside skin; and a long needle for injecting deep into the muscles. I use dressmaker pins for sutures and a

RESTRAINT



This shows an excellent type of restraint for examination of pretty much any part of the head, neck or body, and for operations on these parts under local anesthesia. The animal can stand and can be moved forward, backward or sidewise. It cannot kick, strike, rear or plunge. With a man at each end of a 20-foot rope, take it from behind the animal, as shown, forward, pass both ends between the forelegs. Carry each end outward around the foreleg just below the elbow; pass the ends under the side lines and up to the withers and tie. The secret of success is in having the rope snug and snugger. Dr. T. A. Sigler is shown in position for operation on the tail. Even cases of "crazy sore neck" may be treated without other restraint than that shown here. Some use it in accustoming young horses to a man in the saddle. Only a cayuse so tied can buck.

pin cutter to clip off the ends and heads. Wrapping this with a linen suture helps to prevent hemorrhage.

After the restraint is applied, the seat of operation should be thoroughly cleansed and anesthetized. A good antiseptic for tail work is Quitman's solution (acetone, alcohol and lysol), or iodine used a couple of times after cleansing with bichloride solution. Any good local anesthetic will do; a combination of dulcin and epinephrine works well and is lasting, or a 2% solution of procaine may be used, or butyn and epinephrine.

The tail should be raised high over the back by an assistant, but should not be stretched too tightly until after the injection is made, as there may be some difficulty in forcing the anesthetic solution into the muscular tissue. After the injection is made, the assistant releases the tail and about ten or fifeen minutes are allowed for the anesthetic to take effect.

The operator now stands directly behind the horse, inserts the nicking knife through the skin on the lower surface of the tail, about one inch from the body and just slightly to the left of the median line, to avoid puncturing the middle coccygeal artery. The point is then advanced to the vertebrae, with the tail flexed so as to extend the muscle being divided, the cutting edge is turned toward the muscle and the muscle completely sectioned, care being taken not to cut through the outer skin. The knife is then withdrawn and inserted on the other side in the same way, dividing the opposite muscle. A pin inserted through the knife wound and wrapped with linen suture helps to control hemorrhage. The tail is bandaged with heavy cotton dressing. This may be applied at first to an ordinary harness crupper, wrapped heavily and padded. Some prefer to use the tailset from the start, but I do not like to put the tail in the tailset until all bleeding has stopped.

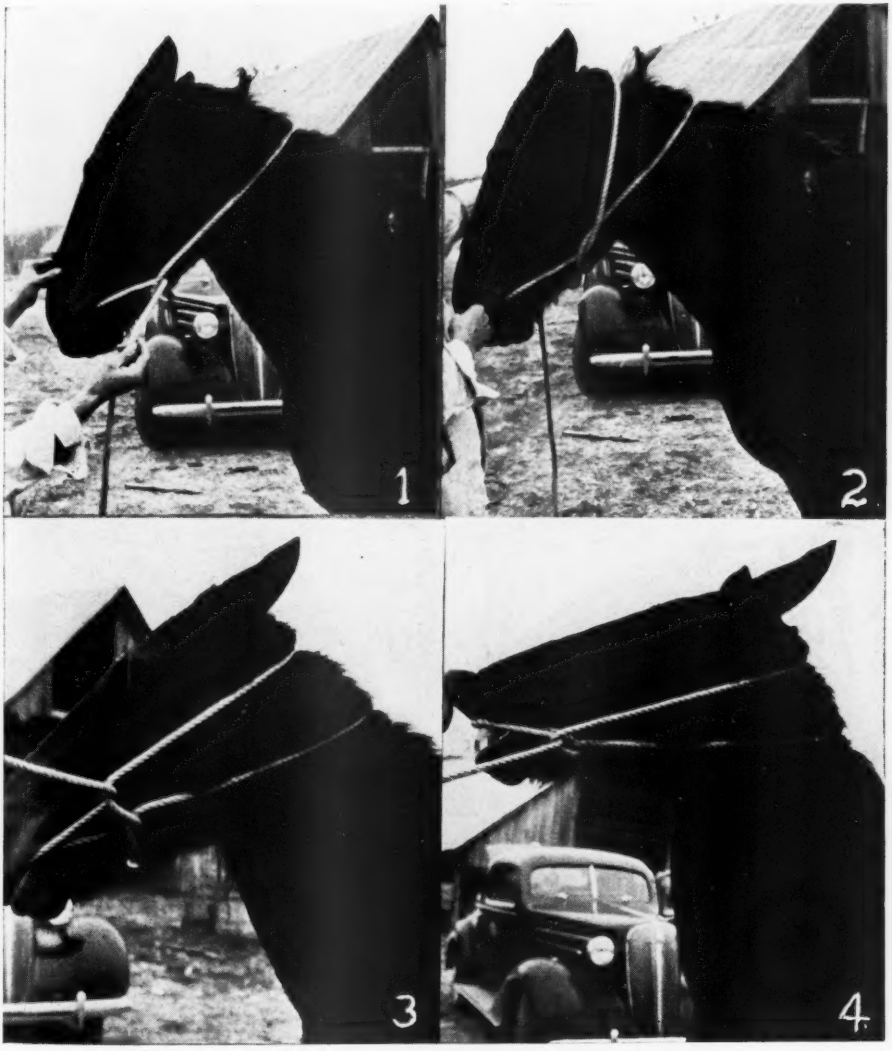
The operaion for correction of curvature of the tail is performed with the same restraint as in tailsetting. The point of puncture is thoroughly prepared and the coccygeal nerve of that region blocked. In case of lateral curvature of the tail, the muscle or muscles affected are indicated by the location of the curvature. Usually the lateral coccygeus muscle is the one chiefly involved, although the dorsal or ventral may be at fault also. Sometimes the curvature exists at more than one point. The point having been determined and the curvature studied by moving the animal, the point of incision and the muscles in that region are thoroughly anesthetized. Then a sharp-pointed nicking knife, or tenotome, is inserted, with the knife turned flat and parallel to the long axis of the muscle until it advances to the vertebrae, when the cutting edge is turned toward the muscle to be severed, and the entire muscle separated down to the skin. The operator knows when he has divided the muscle by the relaxation which takes place. He is also able to palpate the knife as it underlies the skin and fascia. The skin is divided only at the original puncture. The muscle is cut until the tail has as much faulty carriage as it had originally, but in the opposite direction. If this is not obtainable at first, the dorsal and ventral muscles are sectioned also. When the correction has been made, a mild antiseptic pack and bandage are applied. The bandage takes the place of a tourniquet in controlling hemorrhage. A tight bandage should not be allowed to remain on too long.

In some cases, a faulty carriage may be due to a weakness of the muscles on both sides; the tail hangs on one side and then on the other. In these cases, it is best to cut both sides as in tailsetting. In a few cases of extremely long tail bones and sorry carriage, I have amputated some of the distal coccyges.

Quoting from *H & G Monthly Messenger* of July-August: ". . . you can sever caudal muscles but you can't change a horse's mind in doing so. In other words, ginger sometimes does more than the knife." Some horses are hard to correct and it is necessary to use a tailset most of the time.

Docking

For the docking operation, the same restraint is used as for tailsetting, and the same kind of anesthesia. The tail is sheared and the line of incision anesthetized, first using the proper antiseptics. The length of the dock should be in accordance with the size of the horse, not too long a dock for a short, blocky horse, and not too short a dock for a rangy one. A good way to gauge the length is to dock the mare so that the point of the tail is about at the end of the



War Bridle

1. Standing on the near side of the horse, the lariat is looped about the neck, then brought through the mouth from the off side and taken back through the loop that encircles the neck. 2. Pass the rope up over the head. 3. Bring the rope down and through the mouth a second time and then through the loop that passes over the head. 4. Adjust the second loop that passes through the mouth, between the upper lip and the teeth and pull up snugly.

vulva, and an equal distance should be allowed for the length of the dock for the stallion. The hair is clipped at this point; the tail soaked with Quitman's solution, rubbed in with a good, stiff scrub brush, or painted with iodine; and a local anesthetic injected deep into the muscles around the tail, at the line of incision. After a few minutes, a tourniquet is applied above the site of amputation. Parcel post twine makes a good cord to use; it is soft, draws up tightly, and may be left on for one and a half to two hours.

The instruments used in this operation are: a large, curved needle, preferably a Schmidt's handmade curved needle, which is about three and a half to four inches long and very sharp. This should be honed down well, as the tail is tough to sew. A small knife blade, the same type of blade as that used in tailsetting, is needed, as it is easier to guide the line of incision with such a knife. Other instruments include a bone cutter, heavy scissors for cutting hair, and scissors with corrugated blades. The incision is started on the top of the tail, dorsally, from the center. The knife should be inserted deep into the muscle and an incision made from above, backward, downward and forward, making a circular flap on the side. Then the knife is taken from the starting point down on the other side of the tail, around underneath, cutting to the bone all around. A heavier scalpel is used to unjoint the tail. Sometimes in snapping the tail out, the bone may break and protrude; the heavy bonecutters are used to clip this off. Three or four heavy linen sutures are used to suture the incision. A tourniquet should never be placed high on the tail near the buttocks in docking, for if the attendant forgets to take it off in due time, the entire tail is lost. If he neglects to remove the suture, there is only a short slough above the dock. In any case, it is wise for the operator to make a point of supervising the removal.

If horses are docked in this way, the hair grows almost to the ground when the animal is not in show. It is a more surgical and more humane method than the old-fashioned one of docking with the docking shears and burning with the hot iron.

Docking is illegal in some states, except where the operation is of benefit to the horse, as in cases of disease or tumors, and there is much agitation by humane societies for the enactment of such laws in states not now having them. Since, however, a straight tail with a high carriage is in universal demand both for show purposes and for saddle horses, docking is quite generally practiced, and the effect of the law has been to take the operation out of the hands of qualified veterinarians and place it in hands of quacks, who employ as a rule the old-fashioned, barbarous method of hacking off the tail with improvised shears and searing the stump with a hot iron, using no anesthesia.

The chief objections to docking, which led to the passage of the laws against it, are the pain suffered by the animal during the operation and its subsequent inability to brush off flies with the docked tail. If the surgical operation described in this article is properly performed by a competent veterinarian, both these objections are removed. In the first place, the modern operation is far less painful than that performed on thousands of lambs docked (without anesthesia) in all states; and it is certainly less painful than the routine dehorning done in all states. In the second place, when this method is followed the hair will grow almost to the ground when the animal is not being used for show purposes, making a perfectly adequate fly switch. In other words, the effect of the anti-docking laws is exactly opposite to that intended; docking persists whether we like it or not, and laws against it simply mean that thousands of animals are subjected to the torture of the old, barbarous method applied by unscrupulous laymen, instead of receiving the benefit of the modern operation developed by veterinary science.

The State of Indiana, where a great many show horses are bred, has recognized these facts by legalizing this operation. Similar action by other states would appear to be desirable from a practical, humanitarian standpoint.

Tetanus in a Parturient Mare

A year ago last spring we were called to see a western mare that was supposed to be having trouble foaling. The owner had purchased her from a dealer recently and did not know when she was due to foal. On arriving at the farm we found the mare heavy with foal and also suffering from a bad case of tetanus. She was standin the hot sun in an orchard, hardly able to move. With some difficulty we finally got her into an unoccupied basement barn where it was dark, cool, and of course quiet.

First Stage of Tetanus
The animal is dull; acts much like the beginning of impaction, and shows nervous reflexes to any noise.

The jaws were set firmly and on looking her over a small wound was found on a front leg. This was cleaned up and tincture of iodine applied once daily. Five thousand units of tetanus antitoxin was administered and more telegraphed for. The next day 20,000 units was given in the jugular. Following that 5000 units was given daily for four days and lobeline sulphate was given regularly. On the fifth day her jaws began to relax a little and she was able to take a little food.

While there is nothing out of the ordinary in the foregoing, it is interesting that the mare showed every indication of foaling at any time. Every day the owner seemed more worried about what was going to become of the foal—would it come dead, would it come at all, or what would happen. We had never seen or heard of a mare due to foal having tetanus and we couldn't tell him what would happen.

The mare was slowly recovering and eating a little more every day, when one morning on opening the barn door there was as nice a colt as anyone would want to see. Of course we were agreeably surprised. We discharged the case then and there and later learned that both the mare and the colt did fine.

Second Phase of Tetanus
The clinical picture of tetanus in this stage resembles that of no other malady, and can be diagnosed easily.

In treating tetanus it is not always possible to find the seat of infection as in this case, but when it can be found and the wound can be treated daily with tincture of iodine, we believe it increases the chances and shortens the period of recovery. This case was treated under ideal conditions—where it was dark, cool and quiet.

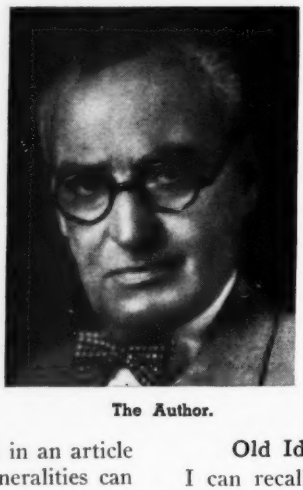
SAMUEL BURROWS.
Shaker Heights, Ohio.

Cast for Castration
This shows the animal down, tied, head held out straight, with no chance to struggle or try to get up. All we ask of the man at the head is to keep the nose held up and forward.

Equine Breeding Problems

By J. F. DE VINE, Goshen, New York

When requested by that genial sage of the range, the editor of this special issue of VETERINARY MEDICINE, to contribute to it, I asked him to name the subject and he suggested "Equine Breeding Problems," to include an answer to the fellow out in the sticks who asks "Doc, why don't my mare ketch?", and also to add a word about the foal. Well, these are good questions for the practitioner who still has to do with horses and who is not better informed on breeding impediments than most of us and not too scientific to talk every day language. We will discuss the mare first; although even the limited knowledge we have on the subject could not be contained in an article of reasonable length, some generalities can be taken up.



The Author.

In the case of the mare that is bred only now and then or that has never been with foal, if there are no serious organic abnormalities, the trouble is, usually, easily corrected. It may be simply a catarrhal vaginitis, which usually can be relieved by a non-irritating alkaline douche, or a mild ovarian dysfunction which may be corrected by a few massages at weekly intervals, or a large cyst that needs draining, a very simple operation with a good sized needle or small trocar and piece of tubing —in fact, so simple I fear it is being overdone, or attempted when not necessary; it is almost a fad, so to speak.

Then, too, we must not overlook the possibility of the stallion being at fault. He may be suffering from a mild orchitis that can be detected only by a most careful examination; or he may appear to be all right and give perfect service and still not secrete normal sperm cells. This is often so for a time after a long shipment or a siege of sickness.

But at large breeding establishments, unless great attention is given to strict sanitary precautions, all is not so simple, and breeding problems multiply and become more serious. When we go into deeper troubles such as cervicitis, metritis, pyometra, suppurative vaginitis, suppurative cystitis, relaxed or injured vulva, leucorrhea and what not, then my advice to the novice is to seek the aid and coöperation of some man who has had special training and experience in this work. It just isn't fair to the animal owner or to the veterinarian to do otherwise.

Old Ideas Often Erroneous

I can recall, 30 to 40 years ago, when owners used to want mares "opened up," and my usual reply was that I had never seen one that needed "opening up" but had examined many that needed closing. In other words, a nice tight cervix free from infection does not need any tampering with. In speaking of a tight cervix, here is a pitfall that may ordinarily ensnare any of us; occasionally the cervix of a mare or a cow does not close tightly for months after conception and still, if left alone, everything goes on all right. In such a case, if we made a careless examination of the vagina and cervix only, we might pronounce the animal not pregnant and prescribe treatment that would be an injustice to the owner and a disgrace to the veterinarian. It is the same old story—be careful and then some. We all make mistakes enough, but the careful man makes the fewer.

Watch Out for Pregnancy

As in cattle, the first thing to know is how to diagnose pregnancy, in order not to mistake a gravid uterus for metritis or pyometra. I have often stated, and now repeat, that the man who has had a good bit of ex-

perience in working with cows should easily diagnose early pregnancy and further, in from 6 to 10 weeks, be able to tell within 3 to 4 days when the animal was bred. I do not mean the man who examines a cow now and then; but when one has handled thousands, as some of us have, it is a comparatively simple matter. This is possible because the normal empty uterus of a cow lies in the pelvic cavity, stays there for around 5 weeks after conception, and is easily reached for another month or so. With one hand in the vagina and the other in the rectum, all parts of the uterus, tubes and ovaries may be palpated so that, with interest and experience, one can soon determine the approximate size of the embryo, the amount of fluid, the density of the horn and other factors that enter into diagnosis. It will be recalled that the uterus for the first 3 to 4 weeks after conception is a little firmer than normal resembling very much its condition in estrual congestion, and then in about 5 weeks, when the embryo takes shape and the fluid begins to form and stretch the horn, the walls get thinner and thinner, until some months later when the fetus becomes so heavy that there is a necessity for an increase in the number and thickness of the muscle fibres.

I am citing all this to emphasize the constancy of these physiological changes in the cow. I have records of over 20,000 examinations—there were a good many unsuspected pregnancies in that lot—and where matters were at all normal, I never knew these landmarks to get much out of focus; but I can't say the same of mares. It seems that about every fourth mare I examine for pregnancy differs from the other three, so I cannot diagnose early pregnancy in the mare with the same certainty that I diagnose it in the cow notwithstanding the fact that I worked for years on mares before I tried my hand on cows. Very few cows in our locality were given any attention with respect to their breeding, as it was a common custom among our dairymen to "milk them fat" and replace them with fresh ones or springers. Purebred cattle and advanced registry tests were the precursors of breeding problems.

Mares and Cows Quite Different

No one can make the same kind of examination of the internal generative organs of the mare that they can of a cow, as these organs are so far forward, particularly in a large mare. While with a cow one need not insert the arms much farther than to the wrist, I occasionally find mares where it is almost impossible for me to palpate the uterus thoroughly with both hands and it is sometimes even a problem to draw an ovary back to massage it or to tap a cyst—this notwithstanding the fact that, according to Doctor Marsteller and some others, I am built for the job.

Fasting Is Important

With the mare, as with the cow, an important thing is to have her well fasted; that is, to withhold all fodder for at least 24

Triplet mule colts, foaled by a four-year-old grey, grade Percheron mare, weighing about 1,350 pounds. There was no dystocia. At two days of age, the largest foal weighed 75 pounds, the second in size weighed 34 pounds and the least, 21 pounds. The little one was lively for five days and then died. Reported by Dr. W. R. Harley, McCune, Kansas.

hours, 36 hours being still better. And here is something that those who are accustomed to working with cows and big open mares do well to keep in mind; that there is much difference in both physical makeup and disposition between the big open phlegmatic mares and those of the finer breeds. When one puts his hand in the bowels of a mare of the more delicate breeds, it must be done most carefully, as she is quite sure to strain and, if much force is used, particularly with the open hand, it is evidently a very simple matter to injure the bowel. I say it is evidently a simple matter, for although up to the present, I have escaped such an accident, I know some veterinarians, good capable

men, too, who have not been so fortunate. Only recently, I was called in consultation by an able all-around practitioner to see one of these cases. He had made many rectal examinations of work horses, but this was the first time he had attempted anything of the sort with one of the delicate breeds. He had torn the bowel, but had not perforated the peritoneal coat. The mare bled some and strained violently, for several hours, but was finally quieted and recovered. Such cases, however, usually do not do well.

Another bit of advice: If thoroughbred mares are in stocks, don't tie down the bad actor. It simply can't be done. She is sure to injure herself before giving up. I use a special hopple on the mean ones, and it works like a charm.

Locate the Uterus

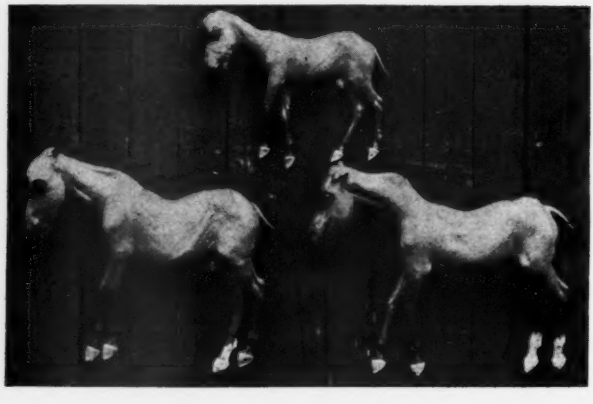
Another thing to keep in mind is that if the colon and cecum are not fairly empty, and if the bladder is ballooned, and if you have not had much experience, you may be bewildered, because the uterus in a three-month pregnancy may seem like all these combined; it is just about the size and density of a distended bladder, particularly if there is a good deal of fluid, and one may find much fluid or practically none in a three- or four-month pregnancy. In other words, one may easily be able to outline the fetus, and feel its bony head, or one may be unable to feel a thing, except the fluid, and so mistake the uterus for a full bladder. Under such circumstances, one should ask one's self "If this is the bladder, where is the uterus?" and, if one can't find the empty horns of the uterus, it is probable that one is dealing with a pregnant mare.

Perhaps a fair rule would be not to try to diagnose pregnancy too early in the mare, unless there is a reason. If a farmer out in the country with a mare or two should want an examination for pregnancy made, it is well to put him off until three or four months after the last service, since the diagnosis is then much simpler and more certain. In fact, after about four months, a rectal examination is usually all that is necessary, as the indications are so evident.

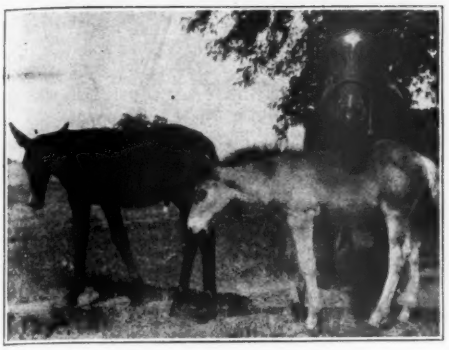
Purebred Studs a Different Proposition

On the other hand, when you are dealing with purebred mares and stallions at breeding establishments where every possible precaution must be taken, it is a wise custom to make examinations for pregnancy about 60 days after the last service. Diagnosis then is not so certain, but if the vagina is dryer than usual and sticky around the cervix, and if one of the horns is slightly enlarged and dense, the classification of such an animal as pregnant will be right in the majority of cases. With the thoroughbreds and standardbreds, where an early colt means so much, it is a worthwhile custom; and if you come upon a case that you feel uncertain about, say so, and make an-

TRIPLET FOALS



Williams estimates the ratio of twins in the mare at about 1 in 500 pregnancies and of triplets at 1 in 300,000. Contrary to the general belief he holds that the birth of two or more young in a zoological uniparous animal is not evidence of an exalted fecundity but quite the reverse and is frequently due to diseased or overtaxed reproductive organs. It represents a considerable economic loss since the foals are so commonly born dead. Both the sire and the dam of these foals were registered percherons. The two larger (males) weighed 55 pounds each; the smaller (female) 35 pounds. They were aborted at 240 days.—Photo by Wempe.



Horse and Mule Twins

The owner of the mare feared she wouldn't "ketch" from the jack and to fool her had her served immediately afterward by a stallion. She fooled him.

other examination three or four weeks later. If the mare is found not to be pregnant, and if there is any suspicion of infection, it is well to culture the cervix.

Mares May Be Examined With Safety

I want to emphasize the necessity of determining if the mare is pregnant in order to avoid treatment which might cause her to abort. Do not misunderstand me; contrary to the old horsemen's idea, examining a mare carefully and properly will not make her abort. Unfortunately the occasional abortion or death caused by an unskillful examination has discouraged owners, and made them hesitate about having mares examined. So, until quite recently, veterinarians have not had the opportunity to make as many examinations of mares as they have of cows. It is almost impossible to abort a cow without pressing out the corpus luteum; it is only with considerable effort that the cervix can be dilated sufficiently to cause infection and death of the fetus, with a resultant maceration and pyometra. Not so with the mare. It is rather easy to dilate the cervix of the mare, and dilation usually means abortion. However, the common myth of the pregnant mare which is served by a stallion and then aborts is a reversal of the actual happening; it is because the mare is aborting that she is in heat and ready to take the horse.

We find early abortions due to imperfect nidation rather than to infection more commonly in the cow than in the mare; in the case of these early abortions, when a cow is served the day she aborts, occasionally conception may take place.

Pregnant Animals May Show Heat

It might be well to remark here that all mares and cows that show heat periods when pregnant do not necessarily abort. In fact, cows may show heat and take the bull several times after they are pregnant and go on to full term. I do not know of any such occurrences in mares, but I do know that owners have told me their mares showed heat after they had supposed them with foal for two or three months and they did not bother to breed them again, because it was too late in the season, or not convenient, and still in due time such mares proved to be in foal. I have always wondered if these mares would have aborted had they taken service. It is in the early cases, which, as stated, are primarily due to imperfect nidation, that abortion and heat seem to be concomitant. Vitamin E has now come to our aid in such cases, as it has specific action on this very thing; but I should like to get the experience of other veterinarians on this subject and, if any colleague knows positively of cases where pregnant mares have been served and still carried their foal full term, I would greatly appreciate full details.

A Word About the Foal

As to the foal; so much information is available in text books, bulletins and magazines on what we might style the more technical side of this subject that it would be unfair for me to take up space here on what others have written so much about; but there are a few little everyday problems that are not greatly stressed in textbooks or other sources.

For instance, unless the foal is to have the attention of an expert nurse, a good rule to follow is to give an enema of plain warm water soon after it is dropped. This may not always be necessary, but often has the advantage of avoiding injudicious medication by the quack or wise neighbor.

Any veterinarian who has had much experience in breeding localities knows that

there are certain fairly common situations that give him some sleepless nights.

One is the orphaned colt. Chemists and others agree that the mare's milk does not carry as much fat as the cow's, but does carry more sugar, and they attempt to give so-called balanced formulas. During the days when I struggled with this problem, those balanced formulas simply did not work. We drew fresh cow's milk for each feeding and diluted it in ratio to the fat content, which varies with the breed of cow, and added sugar; but we soon learned in the case of the foal that was orphaned young that unless we cut the amount of milk down almost to the starving point and fed it every hour or so, instead of three or four times daily (a point on which the textbooks were silent) it was sure, sooner or later, to develop a diarrhea that hung on so long and set it back so seriously that, in many cases, such a foal never amounted to much. Today it is probable that veterinarians can do much better, particularly since dextrose has come to play such a marvelous rôle in allaying acute digestive disturbances.

Foal Running With Dam

And then there is the foal running with its dam that develops diarrhea, particularly in hot weather. Again, what a struggle if it is not handled just right—at least it was so in my juvenile days with no help anywhere. In other words, textbooks, with their swivel-chair formulas, and the concoctions of commercial houses evolved by someone who perhaps had never seen a case, were absolutely useless. The foal has a particular kind of intestinal derangement that is all its own. After years of worrying and struggling, we found that the thing to do was to prevent it, if possible, by keeping the heavy milking mare partially milked out, after the first few days, for several weeks, so that the colt could not gorge itself. That meant milking her into the night as well as in the daytime, and in very hot weather keeping her out of the pasture during the day, in the coolest place to be had. If all this has not been done, and one is called to treat a case where the mare and foal are out in the July or August sun, they should be brought in and the mare kept milked out to a mere nothing. The ordinary mixture of bismuth and what not will not do the foal much good. We finally got together a formula: kino, catechu, camphor and formalin. This formula, or some part of it, really worked when alternated with a very small dose of an aromatic oil. It was not very appetizing-looking and it had to have a "Shake" label on it, but the foal did not care so long as it soothed its "innards."

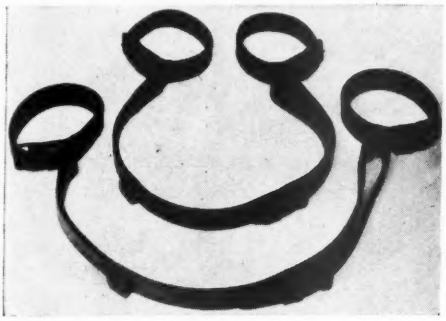
Colics

Just as colicky pains in the stallion give

TROPICAL COLIC

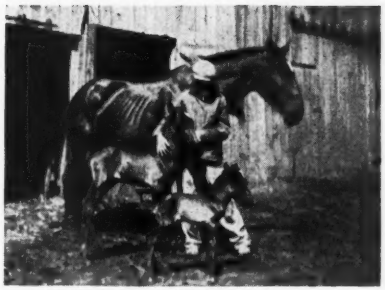
All animals shown in these views are suffering from a type of colic common on all the islands bordering the Carribbean Sea. Both animals on the left had been sick four days when the photograph was taken. The mule died; the horse recovered. The donkey on the right was sick 36 hours; dying 24 hours after the photograph was taken. Some (Roberts and Kinsley) believe the colic is due to strongyle infestation. Others attribute it to other causes. Twenty percent of the equidae on an island may die of it in a single year.

us more concern than in the mare or gelding, the horse foal causes more worry than the filly, because of the danger of strangulated hernia. It is common knowledge that colts are not infrequently born with an inguinal hernia, occasionally on both sides and, while they seldom strangulate seriously, still we cannot wholly ignore them. So the first thing to do with the colicky colt is to put him on his back, have him held up by his hind legs and examine his inguinal region carefully. When the colt is in the right position, if there is just a slight strangulation, gentle manipulation and bouncing him up and down will usually relieve it, but too much poking around is not advisable. If the intestinal loop does not drop back



Breeding hopples used by the author in examining mares for pregnancy and treating them for sterility.

of its own accord, so to speak, rough treatment will not help; in fact, it will positively aggravate the condition and hasten death. In making this kind of examination



Twin foals, born May 10, 1936, belonging to Mr. Harold Hanika, Shubert, Nebraska. At three days of age the larger foal weighed 101 pounds, the smaller, 24 pounds. It was only six hands tall. It was necessary to bottle feed it. The dam is a grade and the sire a purebred Percheron. The photograph was taken by Dr. C. J. Majerus, Falls City, Nebraska.

once, I was fortunate in locating the cause of the little fellow's pains in that his penis was bent back double in the sheath; the minute it was straightened out, all was well.

In a recent letter a colleague who is veterinarian to a large thoroughbred farm and whose opinion I regard highly, states that if he has another bad case of strangulated hernia in a foal, he will either pack the canal or do a covered operation. This raises another question I should like to ask experienced surgeons: How would the covered operation work on such delicate tissues and what has been your method of handling these cases?

* * * *

One of the outstanding addresses made before the Horse and Mule Association meeting, held in Chicago, December 1st, 1937, was the discussion of equine encephalomyelitis by Dr. John R. Mohler. This disease is the most menacing one in the United States today, and the most serious problem confronting horsemen.

* * * *

Navel Ill

Unless summoned in the early stages of navel ill, our results in handling it are nothing to write home about. When generalized, and the victim hardly able to stand, we usually leave some belladonna ointment to apply to the mare's udder, as the foal will not be there to suckle.

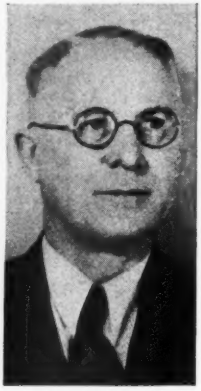
Equine Impactions

By S. L. STEWART, Olathe, Kansas

EQUINE impactions are more or less common during the fall and winter months of every year, except in the northeast corner of the country, in the riding academies and riding horse stables where horses are fed a balanced ration and given proper care and exercise. Especially is this true following a drouth period during the summer months, which cuts the field crops and pasture grass short and makes the proper kind of roughage for horses scarce. Owners of horses are interested in preventing impactions, but for the last few years hay for horses has been scarce and other roughage has consisted principally of bundle oats, oat straw, and in some cases wheat straw only. On account of short pasture in some sections, horses eat grass roots and dry weeds. It is a fact that such feeding is out of line with balanced ration feeding and a primary cause of impactions, but many farmers are forced by climatic conditions to do the best they can under existing circumstances. It is believed that a large percentage of such impactions are in reality the result of a vitamin deficiency causing a dilatory glandular secretion and a more or less impaired intestinal activity.

In this section of the country impactions of this type can be almost entirely prevented by feeding black strap molasses with the roughage. It is prepared by using one gallon of molasses to ten gallons of water in a hand sprinkler; this is sprinkled on the roughage, which is then forked over, and the sprinkling and forking are repeated alternately until the roughage is thoroughly dampened.

This gives an animal from one to two pounds of molasses a day, depending on the size of the animal and on how wet the roughage is made. Molasses is a good feed and a splendid laxative; it also supplies the vitamin lacking in a straw ration. The same preparation of molasses can be more conveniently added when the roughage is ground. A large tank placed on top of a high platform or on the mill house, with a down pipe and a spray faucet is used to spray the ground roughage as it leaves the mill.



The Author

Affections of the teeth can not be ignored in connection with diseases of the digestive system. Any tooth trouble that interferes with efficient mastication of food, and more especially of dry, coarse roughage, is of vital importance in the cause of impactions, and such dental defects must be corrected to help in preventing the recurrence of impaction.

The sudden change of diet from succulent pasture grasses to a completely dry ration, especially if combined with a lack of exercise, also has a tendency toward causing impactions. However, impactions are not uncommon in comparatively well-fed horses, and sometimes occur in spite of all preventive measures. It is a known fact that some horses are subject to impactions.

Impaction is an accumulation of undigested food material or feces, or both, which clogs the alimentary canal sufficiently to impede its normal activity. An impaction may be located in the stomach, sometimes in the cecum, or in either of the two colons. Autopsies have revealed impaction of all these parts in a single case, but such cases are decidedly rare.

Impaction of the stomach is always serious, as the distention of the gastric walls with food causes a partial paralysis that interferes with gastric peristalsis, gastric seretion and gastric digestion. When the impaction is located in the large bowel only, the condition is not so serious and yields more readily to treatment. It is uncommon to find a case of cecal impaction either alone

Sweet Clover Hay

New feeds are bringing new problems to the horse owner and veterinarian. Sweet clover, when young, is eaten by horses having no other pasture. Due to an astringent action, it often brings about a subborn case of impaction. This field of 75 acres produced 75,000 pounds or fifteen billion seeds. At the rate of ten pounds to the acre, enough seed was harvested to seed forty-seven quarter sections.

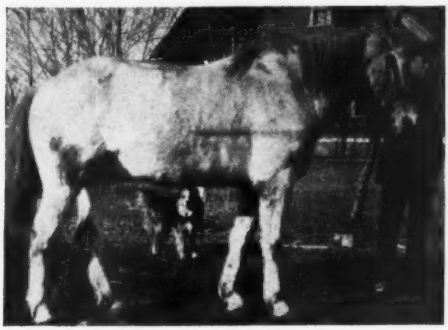
or in conjunction with colon impaction, although it does occur. Others seem to believe that impactions of the small intestines occur, but the writer of this article has never diagnosed one in the living animal nor seen it on autopsy. It is believed that death occurs before impaction of the small intestines can take place.

Diagnosis and prognosis are based upon the symptoms of the patient at the time of the first call; in some cases there are surprisingly few symptoms by which a differential diagnosis can be made. Abdominal symptoms are seldom of an acute character. The pain is generally dull, and the animal may at times eat a little roughage before it again lies down to roll. While lying down it turns its head toward the flank, and exhibits an anxious expression of countenance. To confirm a diagnosis the impacted intestine may be palpated by rectal examination. Auscultation of the abdominal wall reveals an entire absence of peristalsis in some section of the intestinal tract. Coldness of the nose, ears and other extremities, and a fetid odor of the mouth are common indications of impaction.

The length of the course is variable, and usually depends upon the degree of impaction and whether gas accumulation is present.

The less severe cases, subjected to rational treatment, make a complete recovery as soon as the impaction becomes softened and is eliminated from the body. In extreme cases death may be the result of impaction, and not infrequently rupture of the stomach occurs when gas becomes a complicating factor.

In treating impactions the therapeutical measures to be adopted should be based on the leading phenomena present. The vast majority of cases require two or more visits, and it is several days before complete recovery is obtained. Therefore it is advisable that the veterinarian start treatment along a methodical line that can be followed up and will most easily and with the fewest hazards obtain desired results.



First Stage of Impaction

When first noted the symptoms are not pronounced. Inappetence; slight periods of abdominal pain; little, if any, peristaltic sounds, and injected visible mucous membranes, signalize the onset.

If the diagnosis of impaction is made there is no necessity of making a rectal examination the first day, but this should be made on the second day, to massage the impacted mass if it can be reached. It is not uncommon to find the impacted pelvic flexure of the colon pushed backward into the pelvic cavity; by gentle pressure and massaging it may be pushed forward into the proper position, on the floor of the abdominal cavity immediately in front of the anterior brim of the pubis. The replacement often gives immediate relief to the patient.

When a diagnosis of impaction is made the animal according to size should receive into the stomach through a stomach tube three or four quarts of liquid petrolatum at a temperature of 100°F. with which the following has been thoroughly mixed:

Fl. Ext. Calabar bean.....3iv
Fl. Ext. Capsici
Ac. Hydroch. dil. aa. 3ii

If there is no impaction in the stomach this medicament should be followed immediately by one gallon warm water pumped through the stomach tube into the stomach.

Second Stage of Impaction
The second stage of impaction is marked by intermittent pain; some bloat, and rolling.

The animal should be given a large, well-bedded box stall, and watched for any bowel evacuation until the veterinarian makes a return call.

Upon the second visit 12 to 24 hours later, depending upon the severity of the case, a rectal examination should be made, and if the impaction has softened or moved, an intravenous injection of Stewart's eserine and pilocarpine intravenous infusion tablets (Jen-Sal Laboratories), 1 tablet to 300cc of distilled water at 120°F., should be given to horses of 1000 to 1600 pound weight, and 1½ tablets to horses of 1650 to 1800 pound weight. If the impaction has not softened at the time of the second visit the animal should again receive the following:

℞, Fl Ext. Calabar bean
Fl. Ext. Capsici
Ac. Hydroch. dil. aa. 3ii
M.
Sig. Give in Capsule.

The intravenous infusion should be postponed in this case for 12 to 24 hours longer and then given. The full physiological action of the intravenous infusion will be received at once. Defecation will then be obtained in five to fifteen minutes, with five to ten bowel evacuations within an hour's time. This should be sufficient, and no more trouble should be expected. At all times the animal should be allowed to mince at hay, as eating a little tends to stimulate digestion and peristalsis. Mincing at hay also partly overcomes the undesirable gnawing sensation of hunger in the stomach created by the hydrochloric acid administered. The animal should be coaxed to drink water often.

Last Stage of Impaction
In fatal cases, the animal gradually succumbs to exhaustion, and, in some cases, to extreme tympanites. Protrusion of the rectum; staggery gait; glassy eye and cold sweating occur during the last hours.

Lang's solution also is highly recommended in most forms of impaction, especially impaction of the cecum.

It is the experience of the writer that all narcotics are contra-indicated in all forms of impactions and should not be used, as they slow up peristalsis and check glandular secretion, thus adding to the already existing trouble.

Gangrene
This animal became wedged in a straw-stack, and lay on a large rock for several days.

A Few Colic Treatments

By E. V. HOVER, Lima, Ohio

The principal conditions which produce severe gastro-intestinal pain named in order of frequency are:

1. Impaction of the small and large intestine.
2. Impaction of the small or large intestine, complicated with a displaced bowel.
3. Distention of the stomach with food masses or gas.
4. Direct inflammation of the walls of the stomach and bowels.

In gastric distentions or impactions, do not give arecoline or eserine. To keep contents from fermenting, common salt, aromatic spirits of ammonia, salicylic acid, creolin or creolyptus can be given via the stomach tube. Following lavage, one-half grain eserine may be given, together with one quart of mineral oil.

Impaction of the Small Bowel

In the early stages, a subcutaneous injection of one-half grain of arecoline followed, if the results are not satisfactory, by one-half grain eserine, or lentin. The action of the latter is more thorough and less depressing on the circulation than that of arecoline.

If the condition has been neglected, or the action of the foregoing is unsatisfactory, the following may be given:

Aloin	gr. 60
Calomel	gr. 15
Strychnine Sulphate	gr. 1/8th

These come in tablet form and one may give two or three as indicated.

Single doses of equipurge may be given, the contents of a No. 10 capsule being sufficient.

Infusions of water into the rectum; massage of the impacted bowel through the rectum and moderate exercise are beneficial.

If secondary distention of the stomach occurs, treat as in gastric dilatation.

Small repeated doses of belladonna will often give relief, and where the pain is excessively violent an ounce dose of the following may be indicated: Chloral hydrate 240gr; potassium bromide 120gr; extract cannabis ½gr; extract hyocyamus ½gr. This is a non-constipating anodyne.

Impaction of the Large Bowel

Three types of this condition may occur:

1. Impaction of the cecum.
2. Impaction of the colon.
3. Impaction of the rectum (in pregnant mares).

When we have definitely decided there is impaction we usually administer large doses

Good Type Army Remount Stallion

of linseed and mineral oil through the stomach tube and the following stock mixture:

Napthalin flakes	
Oil cajeput aa	℥VI
Ether	
Turpentine aa	℥XVI
Mineral oil q. s. ad	1 gallon

Two ounces of this mixture every two hours, in addition to Reeks' capsules go a long way toward overcoming the impaction.

Where there is complete absence of peristalsis after the oil has been given, the following may be useful:

Strychnine sulphate	gr. 1/8
Eserine	gr. 1/8
Pilocarpine	gr. 1/4

Another treatment which originated in the army, and which is quite popular in the west, is:

Sod. chloride	1 lb.
Formalin	2 dr.
Aq.	5 pints

Give through stomach tube.

Here is another treatment that resembles Lang's medication:

Sod. chloride	1 oz.
Aq. dest.	1000cc

Administer intravenously.

Experience With Lang's Solution

By VILO T. ROSE, Elkton, Kentucky

This paper is presented from a general practitioner's viewpoint, the data having been collected from actual treatment of approximately 75 horses and mules with different types of impactions.

The locality from which these cases derived is the west central portion of Kentucky bordering the Tennessee line. Our feed is somewhat different from that of other localities. Feed raised in this section is rather hard to mature, especially the grain for work animals, which is mainly corn, oats, and barley. (Up to the last few years our farmers raised nothing but corn for the concentrate to be fed to livestock; often immature, this grain when fed alone causes considerable digestive disturbances. The soil conservation program put into effect by the federal government, however, has encouraged the growing of small grains, especially oats and barley.) For roughage, clover, cowpeas, Korean lespedeza, and alfalfa are raised, the main hay being lespedeza. Our lespedeza has a fine, strong, tough stem and like the clovers contains a large amount of coarse fiber. In addition, some of the farmers cut the lespedeza after the seed, which is almost wholly indigestible, has matured. During the winter months the cattle are also fed corn tops cut from the corn about 1½ months before maturity, oats and wheat straw, and a fair percentage of sorghum.

The percentage of digestive nutrients in this roughage is approximately as follows: redtop 50%, lespedeza 54%, alfalfa 52%, sorghum 43.3%, wheat straw 12.5%, oat straw 29%, and corn fodder 31%. There is obviously a large proportion of indigestible matter. With work animals on such rations, and owners often negligent in furnishing enough salt and fresh water, there is little wonder that there are so many cases of impaction in this section.

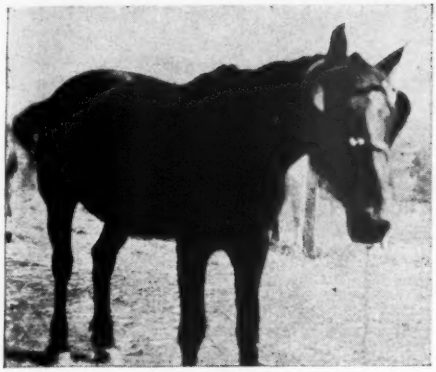
Administering Lang's Solution

Small Intestine Impactions

Impactions of the small bowel are rare, but when they do occur are frequently fatal. The symptoms differ from those of obstipation of the large intestines. They come on suddenly within a few hours after feeding, or directly afterward if the duodenum is involved. Colic symptoms are marked and quite severe, and in some cases a stretched position, similar to that of a urinating male, is noticeable. There is no defecation, or it ceases in a few hours. Rectal examination reveals an extended ileum. The obstructed duodenum can likewise be felt as a cylindrical smooth body. Due to the secondary dilation of the stomach and early inflammation of the mucosa, acceleration of pulse and respiration appear sooner than in cases of impaction of the large bowel. The appetite is completely suppressed.

Impactions of Large Intestine and Cecum

Impactions of the large bowel are more common, and practitioners have differing methods of diagnosis and treatment. In my opinion, rectal examination is invaluable in determining the location, the size, and the extent of the impaction. Such symptoms as elevation of temperature, accelerated pulse and respiration, empty rectum, rectal walls covered with a tenacious mucus, are all familiar. I have on a number of occasions made rectal examinations without being able to locate the mass, although there was proof from external symptoms that an



A Common Condition
This is a combination of acute indigestion, overloading of the stomach, impaction and is often followed by laminitis. Due to delay in beginning treatment, the mortality is high in these cases. Treated early they respond satisfactorily.

impaction existed. In these cases I found that the impaction was in the floating colon, where it is ordinarily out of reach. However, elevating the patient's forefeet caused the impacted mass to roll backward toward the pelvis, where it was easily palpable.

Treatment

In a few cases I have been able to remove impactions piecemeal at the end of the small colon. All other impactions should be thoroughly massaged from one to two hours, and again in eight to ten hours if necessary, in conjunction with whatever other treatment is used.

For a number of years I have used several of the outstanding drugs in treating this ailment. The percentage of cures has been comparatively low, since as a rule the veterinarian is not called until the case is well past the early stages when treatment is most productive. On the whole, treatment utilizing Lang's solution has proved the most successful.

Lang's solution is nothing more than chemically pure sodium chloride and sodium citrate in an isotonic solution. For the average horse or mule one ounce sodium chloride and one ounce sodium citrate in 500cc distilled water makes the best dose. For extra large horses and mules, increase dose up to 600cc. When gaseous distention is found, the gas is removed by a small trocar or antiferments are given; in some cases both are used.

A rectal examination is first made to locate and thoroughly massage the impaction. If it is small and fairly soft in consistence, I use Lang's solution intravenously with only enough antiferment orally to lessen the gas. If the animal seems to have an excessive amount of gas, the stomach tube is passed and left in place as a safety valve to release accumulating gas. It is important in intravenous administration of Lang's solution to inject slowly; it should take eight to ten minutes to inject 500cc. To some of the weaker patients, it is advisable

Fatal Colic in a Mule
The nostrils are widely distended, the breathing deep and labored.

to give a heart stimulant. Occasionally after injection of one-third to one-half of the solution, the patient's nostrils become dilated and breathing is labored; in this case the injection should be suspended for about five minutes. A few minutes after the Lang's solution has been injected the patient wants water and usually drinks greedily; it may be allowed to do so without harmful results.

After the injection of Lang's solution, the gas being under control, the patient may be put in a large stall and left under the owner's care for eight to ten hours. Three or four doses of an antiferment may be left for the owner to administer; this may or may not be necessary, but it keeps down the gas accumulation, and gives the owner something to do.

If the 10-hour period expires without bowel evacuation, a second 500cc dose of Lang's solution is administered. At this

Ruptured Stomach
Following flatulent colic during harvest, this animal died about fifteen minutes after this picture was taken. A gastric rupture was found during the autopsy a few minutes later. Although we were called as soon as the animal was discovered sick, and we arrived within half an hour, the damage had been done.

time, if proper antiferments have been given, the patient is in a fairly comfortable condition. In most cases peristalsis has increased, the animal is more relaxed, and usually is standing. As part of the second treatment I usually wash out the stomach and refill it with about three gallons of the following: one quart raw linseed oil, one pint mineral oil, one ounce formalin (40% formaldehyde), two ounces aromatic spirits of ammonia, two ounces oil of turpentine, hot water to make three gallons. The patient is then put back in the stall and left under the owner's supervision, with instructions to keep the animal in a standing position as much as possible.

In some cases the owner reports six to eight hours later that bowel evacuations have occurred. In other cases he reports the patient's condition improved; that it is more relaxed, with less labored breathing and is moving about and nibbling at hay, but that no bowel evacuation has occurred. In the latter cases I make a third visit, and usually 4cc of lentin subcutaneously, or arecoline hydrobromide in ¼-grain doses will bring about several bowel actions. In using arecoline hydrobromide I administer ¼ grain every 15 minutes to effect. I have never observed any harmful results from the administration of this drug at this period of the treatment.

By way of illustration I will describe two cases of impactions of a type with which I had much difficulty before using Lang's solution intravenously.

Case No. 1.—Mule, age 18 years, in good condition, with history of no previous ailment.

A diagnosis of impaction of the floating colon was made by elevating the patient's forefeet after no mass was found by regular rectal examination. The animal had been in this condition for about 24 hours.

After a heart stimulant was administered, 500cc Lang's solution was given intravenously. The stomach contents were washed out and one quart

Another victim of Ruptured Stomach
Cold sweat, shallow respiration imperceptible pulse, the end is near.

linseed oil, one pint mineral oil, one ounce formalin, two ounces aromatic spirits of ammonia, two ounces oil of turpentine, with enough hot water to make three gallons, were pumped into this organ. One-half grain strychnine sulphate was given subcutaneously. The animal was then put in a large corral and instructions were given for care during the waiting period of 10 hours. On the second visit an examination showed marked peristaltic movement, respiration and pulse nearly normal, muscles of abdomen relaxed; but no defecation had occurred.

A second treatment was administered, using the same method and drugs as the first, and the animal was returned to the corral. Nine hours later the owner reported that several bowel actions had occurred and that the patient seemed to be in good shape. An uneventful recovery followed.

Case No. 2.—Mare, 12 years old, seven months in foal.

Diagnosis: impaction of the left ventral part of large colon. On arrival at the farm I found this animal in an alarming condition, with accelerated pulse, elevated temperature, labored respiration, and cyanotic membranes. The owner stated that the animal had lost its appetite two days past, but

had not shown much pain until a few hours previously. Rectal examination disclosed a large, intense impaction, hard in consistency and almost too firm to massage. Upon passage of the stomach tube the stomach was found to be dilated, and a large amount of gas was removed. The stomach contents were washed out with several gallons of a 1% solution of sodium chloride in warm water. This relieved the pain to a considerable extent and we had no trouble keeping the animal in a standing position. A rather large quantity of gas was removed through a small trocar in the right flank. Since the patient was in a weakened condition, a heart stimulant was given before 500cc of Lang's solution was administered intravenously. (This animal did not attempt to drink any water.) The mixture of raw linseed oil, mineral oil, and the anti-ferment that I have mentioned was then pumped into the stomach.

On the second visit no change was seen, aside from more normal respiration and pulse and increased peristalsis. Accordingly, another 500cc Lang's solution was given intravenously, ½ grain strychnine subcutaneously, and three gallons of 2% saline solution was pumped into the stomach. Following this treatment the patient drank several gallons of water. Rectal examination revealed that the impacted mass was rather soft and that the rectal walls were moist.

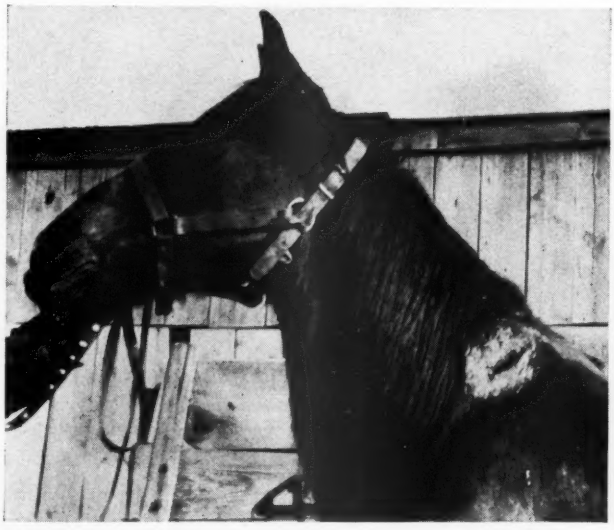
In about eight hours the owner reported that some bowel action had occurred and that the animal was in a much better physical condition; it was therefore allowed to go through the night without further treatment. The following morning the owner reported that several large bowel actions had occurred and that the animal wanted food. He was advised to feed cushed barley, wheat middlings, and a small amount of good hay. The animal made an uneventful recovery.

Infected Hock

One of the troublesome injuries resulting from a small wire cut the owner thought "didn't amount to nothin'."

Summary

In my experience Lang's solution is one of the most helpful and beneficial preparations that the practitioner can use in treating impactions in horses and mules. It is not a prescription to be used by itself, but only in addition to the regular treatment for impaction, including the use of a stomach tube, proper oils, antiferments, a trocar, when needed, strychnine sulphate and other drugs such as nux vomica, together with thorough massage, when possible, of the obstruction in the gut.



Crazy Sore Neck

This condition, as every experienced practitioner knows is one of the most difficult maladies we encounter in the horse. Usually, all kinds of corrosive and painful "home remedies" have been used on the unfortunate victim before professional aid is summoned. The much tortured animal seems to think two legged creatures have also spiked tails.

Equine Influenza

By FRANK HARE,
Lexington, Kentucky

There is a disease in race horses characterized by high fever, marked icterus, and catarrhal inflammation of the conjunctival mucosa, that is being diagnosed as influenza or shipping fever. It usually occurs in young horses following rail travel or some other devitalizing experience, but occasionally occurs in older horses following similar exposure. The disease as we observe it does not present the usual line of symptoms that are given in most of the modern textbooks under the heading Equine Influenza. Pneumonia is a rather common sequel only if the progress of the disease is not checked promptly. Swelling of the eyelids is rarely found, and swelling of the legs only occasionally, and then in a very mild form. A cough, present in a small percentage of the cases, indicates a complication.

Symptoms

In the modern thoroughbred establishment any irregularity in the normal habits of one of the animals is promptly noticed by the groom. The animal did not clean up its last meal; it appears depressed; there is a scarcity of fecal material in the bedding. The foreman or trainer is notified. In a few hours the animal has a chill. The veterinarian finds the animal standing in the corner of the stall with its back arched and its head down. Its hair is standing on end. Its ears and legs are cold. A finger inserted into the buccal cavity encounters a hot, dry mucous membrane. There is moderate excess lacrymation and the cornea is lusterless. The conjunctival mucosa is highly icteric and hemorrhagic with a gelatinous exudate in the conjunctival sac. The nostrils are dilated; the nasal mucosa is injected, and there is a mild watery discharge. The pulse is 65, full and strong. Pressure on the throat may induce a cough, but very seldom. Dry, rasping sounds are heard over the lower end of the trachea and over both lungs. The respiration is about 20 and there is a slight double expiratory effort. Peristaltic sounds are diminished. The temperature is about 105°F. If any feces are found they are covered with mucus.

Early Treatment

It is quite generally agreed among veterinarians engaged in horse practice that if there is such a thing as a specific, we have it in the treatment of this disease, provided that the sick animal is treated in the early stages. Supplemented by proper nursing, neoarsphenamine has reduced the course of this disease by about one-third. Without the use of this drug the usual course is two weeks or longer, and many fatalities occur as the result of pneumonic complications. In cases of long duration the usefulness of the horse for racing is greatly impaired.

Bandage the tail and give the animal an enema with about two gallons of warm sodium bicarbonate solution, two ounces to the gallon. Rub the legs down briskly with a mild stimulating liniment and cover with cotton and bandage. Apply the same liniment over both lungs and cover the animal with a night blanket. Avoid using liniments containing capsicum on light horses, as they are very sensitive to external stimuli. If the weather is very cold put a cooling-out blanket under the night blanket. Give, through a stomach tube, about 10 quarts of warm water in which has been dissolved four ounces of sodium bicarbonate and 16 ounces of sodium sulphate. (This combination is put up in friction top cans by pharmaceutical houses.) Give intravenously 4.5gm neoarsphenamine dissolved in 200cc of distilled water. The drug may be administered with a gravitation outfit using a 500cc rubber stoppered bottle. In that way intense swelling and sloughing will not be experienced in case some of the material gets outside the vein. No twitch is used unless absolutely necessary. The caretaker is instructed to give the animal, at each meal, two quarts of equal parts of oats and bran. Hay is removed from the stall and none is given until further orders. Provide plenty of lukewarm drinking water to

which has been added one ounce of sodium bicarbonate to the gallon of water. A bottle of medicine containing stimulants and intestinal antiseptics is left with instructions to give a dose every three or four hours. The caretaker is told that if he should take the temperature again in four or five hours he should not be disturbed to find that it has gone to 106°F. or higher, but that a very definite improvement should be expected by morning.

Good Nursing Essential

The following morning the temperature will be down to 102° F. or thereabouts. The

Swamp Fever Type of Influenza

bowels will have moved freely during the night, and the animal will be much brighter, move about freely in its stall, and nibble at its bedding. Remove the leg bandages, give the legs a brisk rubdown, using the same stimulating liniment, and replace the bandages. Give the body a brisk rubdown with a rubrag without removing the bandages. Give a small flake of lespedeza, alfalfa, or mixed hay. Continue the bran and oats ration and continue the fever medicine as previously directed. The animal drinks freely. The temperature will rise again in the afternoon to about 103.5°F., and the trainer should be so advised. On the morning of the third day the temperature is normal, and remains normal thereafter. The bran and oats ration, the fever medicine, and the alkaline drinking water are continued until the temperature has been normal for four days. The amount of hay given is increased each day until by about the fifth day the animal is on a full hay ration. Brisk massage of the legs and body morning and evening is continued and the bandages and blankets applied as before. After the temperature has been normal two days the animal may be walked slowly under the shed for a brief period if the weather permits, and after a week given light exercise under the saddle.

Horse Shoe Pitching

The ancient art of horse shoe pitching is still a popular pastime everywhere. Old timers by the thousand from Idaho, Iowa and elsewhere flock to Florida in the winter time to pitch horseshoes—at least that is their principal occupation there. They return North with the robins to demonstrate their skill in their old home towns. Such is life—and horseshoe pitching.

Kicks

Due to the hazards of infection, kicks by shod horses are particularly troublesome to handle. As a rule, unless sutured at once, they are better treated as open wounds.

Equine Practice

Equine practice is the most exacting, and, in many cases, the most disheartening of any phase of our work.

When we are called upon to treat a case of milk fever, the results are often amazing with a minimum of effort. How different is the picture when we administer to the equine patient! Working long and faithfully, using several dollars' worth of supplies, sitting up most of the night, we often see our patient growing worse, until death ends the scene. In the one case, we have worked perhaps 30 minutes, and left a satisfied client. In the other, we have seen all our work nullified by loss of the animal.

Shoe Boil
This enlargement was removed by opening and drainage with weekly administrations of a fibrolysin solution, and iodine internally. Total ablation of these tumors and a neatly sutured wound make a fine *looking* operation. Usually it doesn't look so well 60 days later.

A Puzzling Case
Last summer this horse was found sick one morning. Normal temperature; cold sweat; lack of coördination; glassy eyes; extreme weakness. Died in a few hours. Encephalomyelitis suspected. No other cases like it occurred. What was it?

We are called to see a neglected wire-cut the owner thinks "only a scratch." In spite of all our efforts, it develops into an "elephant leg," and as long as the horse lives it is a negative advertisement of our skill. The owner always informs the by-stander: "Yep, I got Doc, and see what he done!"

Mule With Shoulder Galls
This animal regarded every one with suspicion after the owner had tried to heal his shoulder with blue vitriol. I regarded him in the same fashion when called to treat him.

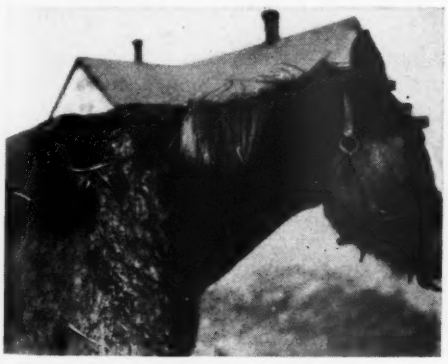
Only those who bore the brunt of the brain fever plague last summer will ever know what they endured in the way of work, worry and discouragement.

Eye Injuries
Did you ever try inserting a tablet of quinine and urea hydrochloride in the inner canthus, and placing the patient in a dark stable for 24 hours? Also, if there is an adherent oat hull on the cornea, apply peroxide with a swab of cotton.

On the other hand, it is this inherent susceptibility to disease or infection that builds a good equine practice. Despite all the free advice, patent medicine venders, unscrupulous quacks, God-anointed "vetinaries" who learned how to use an "eppidermic" vaccinating cattle for blackleg, and a host of other parasites, the competent practioner thrives.

Fistula of the Withers
Where the spinous processes are not too much involved, treatment is comparatively simple as compared to the radical surgery of a generation ago. This case recovered in about two months.

Each locality and section has its peculiar and baffling ailments, largely due to the habits of care and feed. What is successful in New England may be utterly worthless in the Southwest. Even in different parts of a state one may find diseases requiring radically dissimilar handling.



Advanced Fistula of the Withers
This case had been "running" for over a year, according to the owner, who could "doctor hosses" with the best of them. However, this stumped the self anointed authority, and he finally admitted defeat. With good drainage; cleanliness; serum therapy and blood tonics, the victim recovered in 6 months.

Equine practice ebbs and flows with the season, economic factors, and the general trend of farming. The most fortunate general practitioner is the one who is located in a diversified section. When horses and cattle are down, hogs and sheep may be high priced. Then again, the buying power of the farmer plays a prominent part. If he is prosperous, he has his horses' teeth fixed, and the bot treatment administered. When he is unable to market his crops at a profit, he lets things "slide". Those of us who went through the dreary agricultural years of the past decade readily realize this.

Abscess Caused by a Diseased Tooth.
This tooth, the first molar, was abnormally large; measuring 5½ inches from crown to root. An uneventful recovery followed extraction.

The equine practitioner must be adaptable and ingenious. He will learn by experience and observation which cases may respond to lentin or Lang's treatment, and which should be given large quantities of oils or other liquids.

No other person can teach him this knack of professional judgment; he either possesses it or he does not.

The man who early realizes his limitations, and endeavors to increase his knowledge and skill by observation, profiting by the experience of others, and with an open mind to all he hears and sees, makes a pretty fair practitioner.—E. T. B.

World's Largest Horse Market

By W. J. MOSLANDER,
Grand Island, Nebraska

THE horse and mule market at Grand Island, Nebraska, had its inception in the year 1902. That year a few auctions were held but receipts were comparatively small. However, buyers attending these first sales gave encouragement to the project until now this market for horses and mules is one of the largest, if not the largest, in the world.

In 1918, cattle sales were introduced at the insistence of buyers, and in 1925 hog sales were added. The combination of these sales during the year 1936 reached a gross total of over $4,500,000. The total number of horses and mules sold here during the year 1936 was over 20,000. All ages, sizes and classes are offered, and there seems to be a ready market for them.

Nebraska, Kansas, Oklahoma, North Dakota, South Dakota, Wyoming, Montana, Idaho, Washington, Oregon, and in some years Canada furnish the bulk of this supply.

The ratio of horses to mules is about five to one. Many colts are bought by Nebraska farmers to be grown to maturity as serviceable work animals. Most of the young mares and practically all the mules are purchased by southern buyers. The eastern and northeastern buyers like a good serviceable horse ranging from 1350 to 1600 pounds, and take mostly geldings. Horses from five to eight years of age suit this trade very well. The color of the animal is a big factor in the eastern trade—grays, blue roans, red roans, sorrels and light bays command better prices than blacks or dark browns. A load of light-colored horses as compared with a load of dark-colored animals of similar quality, age and condition will sell for from $10 to $20 per head more to an eastern buyer.

Up in the northwoods country of the lake states a larger horse is wanted, 1550 to 1700 pounds being a good weight. Of course, age and quality are always primary factors in

A beautiful Shetland from Markham, Virginia.

values, but it seems the users of these larger horses are not so severe in demanding animals free of such conditions as "hard heels," "side bones," or other slight blemishes of limb and body, where it is evident the blemish does not lessen the working capacity.

One particular feature in the purchases of the eastern, or lake states buyers is the call for gentle, well broken animals. Many good horses are rejected for being "stall shy," or "halter pullers," and are passed over for gentle animals of less value in so far as actual quality is concerned.

Another thing very much objected to is a brand. For some reason the people of the north, east and south seem to think that a brand on a horse makes him a first cousin to a wild cat. If the animal happens to have several brands on him, he is placed in the same class as our modern gangster. Of course, the buyers themselves know the necessity of branding as a mark of identification and record, but the ultimate end of the trade, the purchaser at the final destination, discriminates very severely against the branded horse.

The southern buyer wants perhaps more different types of horses than all the others combined. He takes the cotton mule, the sugar mule, the mining mule, the young and the old, the very best and the very poorest. Mares are preferred, and young small mares

are bringing a premium over all types for the southern trade.

Grand Island also supplies a great number of horses and mules to the markets at Kansas City, East St. Louis, Atlanta, Montgomery, Memphis, Fort Worth and other large markets. However, the bulk of the shipments are sold direct to buyers who have definite trade territories in smaller farming communities.

The business of feeding horses and mules for market is erratic. The summer of 1937 for instance most speculators who could not see "the sky as the limit" of price lost a lot of money on the mule market. In 1936

Cracked Rib
This colt evidently rolled on a rock or some other object and cracked a rib. It required more than six months to heal.

the horse feeders suffered a like fate because the spring market on horses was poor. This statement does not imply that there is no money made in the feeding of horses or mules. Probably every one reading this article can remember when a long profit or big loss has hit the dealer.

From the angle of veterinary medicine, equine practice is the most fascinating of our many types of work, especially when connected with sales barn work. There always has been and probably always will be the "gyp" horse trader, who wants a plug put in some animal. These fellows and their wares are to be guarded against, always. Treatment for heaves, windies, crampies, sweenies, facial uplifts and even cosmetic treatments are asked for and always denied. "Bishoping," that age old trick, is perhaps the most common of the gyp trader's faking. It has not gained a foothold among veterinarians, but some of it is done by laymen.

Caring for horses and mules prior to sale

Good saddle ponies are still useful on the ranches of the West and Southwest.

includes the routine inspection work, supervision of interstate movements, and the treatment of occasional colics, injuries, or an infrequent case of azoturia that may go down after a run on the try wagon. All work animals are hitched and tried for wind and work, and also for gentleness. Blemishes are called and recorded at time of sale, and any fault not mentioned at time of sale is sufficient reason to reject the animal.

In preparing our feed lot horses to go on full feed for fattening, we observe the following program: Each horse receives 10cc doses of equine influenza bacterin at intervals of three to five days. At the time of the third dose, an intravenous dose of neoarsphenamine is administered, 3 to 4½gm, according to the size and condition of the animal. Our bacterin is made from strains of the organism gathered from the infection present in the yards. We have about discontinued the use of equine influenza serum on feed lot animals for three reasons: first, because of the short duration of protection; second, because of the high cost of repeated doses of serum; and third, because of our own observation of results which have been favorable with the bacterin and neoarsphenamine treatment.

Hospital cases run less than 5%, including influenza, pneumonia, purpura, cripples and other conditions which may arise in any feed lot.

The Modern Supply House

Those of us who have been in practice for the past quarter of a century can appreciate what a good, speedy, and, above all, reliable supply service means to us.

In the "good old days", several large pharmaceutical firms condescended to carry a few veterinary supplies as a side line. These were in charge of some inexperienced clerk who did not know the difference between a float blade and a hoof

When Winter Comes
This is a standard form of rural transportation in the northern sections of the country, when the snow king reigns from one to four months in the good old winter time.

rasp. However, the order was filled whether it was understood or not.

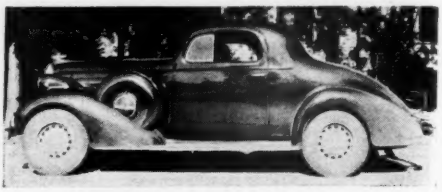
We remember once we broke our favorite hypodermic syringe, with about 60 horses awaiting immunization against influenza. We ordered another one of 8cc capacity, and had specified as plainly as our command of the English language could signify just what we wanted.

Imagine our feelings when we opened up the package, and found a 30cc hog cholera syringe, with several 14 gauge needles, large enough to use on a baby elephant.

We are not hot-tempered, but rather easy-going, for some years of baseball playing had taught us the futility of "cussing" the umpire. But our clients were awaiting us, and as we took another peep at our precious "hypodermic", our feelings overpowered us, and we voiced our sentiments in words that even a sheepherder's dog could understand.

In those days we could order bacterins and receive serums, or *vice versa.* It reminds us of when we had our local druggist along with us on a trip to the mountains to examine a band of sheep. Coming back, a sudden rainstorm turned our country roads into a sea of mud, and to add to the joy of life, we lost a chain and took the wrong road in the pitch-like darkness.

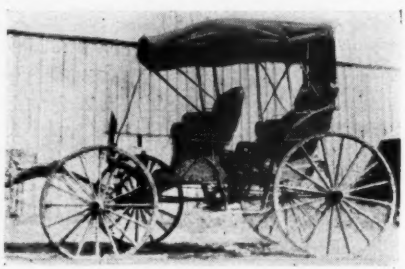
Coming to an intersection with a sign post, our immaculately clad drug store pro-



Speedy Transportation
With the modern auto, the veterinary practitioner can cover a wide territory, and render quick service to his community. The modern supply house aids in this efficient program.

prietor got out to see where we were. The first step in the rich, greasy wheat soil caused him to sink over his shoe tops, but he manfully plodded on. He, too, had opened up too many bum orders to let a little thing like that discourage him.

Then we heard a loud baritone voice



In the Horse and Buggy Days
Fifty years ago the owner of this family buggy was the pride and envy of the entire neighborhood.

ring above the patter of the rain. We never knew until that night what a complete vocabulary a druggist carries under his suave and benign countenance. The reason for this outburst was apparent after he had climbed up the sign post, and burned his fingers with lighted matches trying to read the following legend:

"See Jess For Ice Cream."

Only that and nothing more.

As we contrast those carefree days with the present, we are amazed at the efficiency of the modern veterinary supply house.

Western Chuck Wagon
In the western range country, the horse-drawn sheep herder's wagon is still a standard mode of conveyance, and indispensable.

Established and conducted by experienced practitioners, they know just exactly what the man in the field wants.

We can now make out an order, writing in a legible hand, or, better still, using the typewriter; drop the letter in the mail, and receive just as we specified, within 24 or 48 hours, due to conveniently located branch houses.

This service allows us to keep a small stock of supplies on hand, so that we can have fresh materials to work with. Also, we do not have so much money tied up in biologics or other supplies rarely used.

Logging in France
This was taken in France in 1917, and shows how the 20th Engineers put in the time between signing the pay-roll and chasing cooties.

Again we say to these well-conducted veterinary supply houses, thanks! from a grateful practitioner who goes out in all kinds of weather, night or day, rain or shine.—E. T. B.

* * * *

Last year, the death of 131 veterinarians was reported in the veterinary press.

There were 2501 students enrolled in the veterinary colleges of this country and Canada last year.

Nearly six million dollars worth of veterinary biologic products were produced for animals last year.

The American Trotter—Lou Dillon, 1:58½

Iowa is the leading horse state with 903,000.

According to the 1935 census, there were 11,861,000 horses and 4,822,000 mules in this country.

Texas, with 501,017 farms embracing 167,963,520 acres, or an average of 275 acres to the ranch, leads all other states in the number of livestock.

"Of the 157,984 cases of equine encephalomyelitis reported last year, Minnesota had 41,159, with approximately 9,200 fatalities; Iowa had 31,884; South Dakota 29,702; North Dakota 17,000; Montana 763 and Wisconsin 346."—*W. S. Gochenour.*

The Arabian Horse

By H. H. REESE,
Pomona, Calif.

Arabian Horses
Striking "action" photo, called the "Three Graces," taken at the Kellogg Institute of Animal Husbandry, Pomona, California.

When an Arabian horse is brought to this country from its native land, it is necessary for the sheikh of the tribe from which the horse was secured to give a written statement of the animal's breeding, upon which he puts his seal.

This must further be certified to by a consul of the United States. The horse can then, when properly supported by export and import papers, and upon being passed by the Board of Directors, become registered in the stud book of the Arabian Horse Club of America.

Few Purebred Arabian Horses

As nearly as can be estimated, there are not over 700 living Arabian horses in this country today. Only a few years ago, W. R. Brown, president of the Arabian Horse Club, made a trip through Arabia, and found the tribesmen turning to motor cars for both travel and fighting, with the result that the breeding of horses was on the decline.

Natural Endurance

The environment in the Arabian desert in itself tended to produce a very enduring and easily-kept horse. The extremes of heat and cold and scarcity of feed and water made the survival of the fittest a major fact in reproduction. Long marches were frequently made, and only the individuals that stood this rigorous test became a part of the breeding herd. The unfit were eliminated.

The tribesmen succeeded not only in breeding enduring horses but also in perpetuating a breed famous for beauty and refinement. These horses today are noted for their exquisite heads, with great width between the eyes, which are large and prominent.

The jaws are strong, and the muzzle extremely fine, but the nostrils are large in proportion, as is also the trachea, giving great breathing capacity.

The Arabian horse has one less lumbar vertebra than other horses. This gives it a short, capable, weight-carrying back, and causes the last rib to be close to the point of the hip, a characteristic of horses known for easy keeping qualities. It also has two fewer vertebrae in the tail. The bone of the Arab is hard and dense.

What Color Predominates

Many people seem to have the impression that Arabian horses are piebald, (spotted) or white with pink skin. While Arabians occasionally have white markings, such as a blaze, star or stripe on the face, and white on the legs, the skin, except under the markings, is always dark. Horses with pink skins are known as albinos, and are never found among the purebreds. Since albinos develop

saddle or harness sores very readily, the breeding of them is not very practical.

Many pure Arabians are white, but they have a dark skin, especially noticeable around the eyes and muzzle, and they were grey when young. Practically all our beautiful dappled greys owe their color to their Arabian ancestors.

The Arabian Horse Club states that 50% of the Arabian horses in the desert are bays; 30% are greys, and the rest are various shades of chestnut.

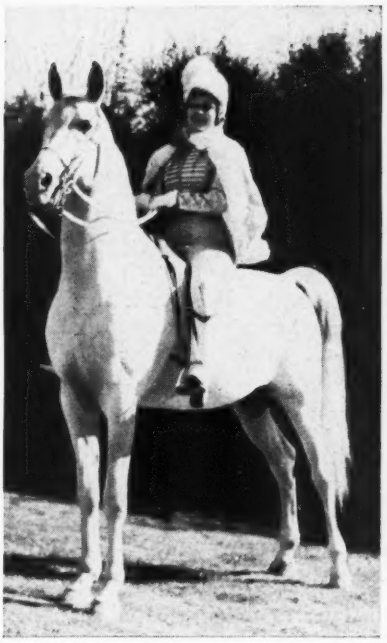
Typical Weight and Size

A full-grown Arabian stallion stands about 15.1 hands tall, and weighs 1025 pounds. A typical mare is around 14.3 hands, and weighs 950 pounds. Stallions vary in height from 14.2 to 15.3 and mares from 14.1 to 15.2.

While values, of course, are variable, a good purebred Arabian will bring from a few hundred dollars each for young foals to several thousand dollars for mature animals.

Foundation Stock

The English thoroughbred breed was founded by the three eastern stallions: the Darley Arabian; the Godolphin Arabian and the Byerly Turk, which were crossed with native English mares.

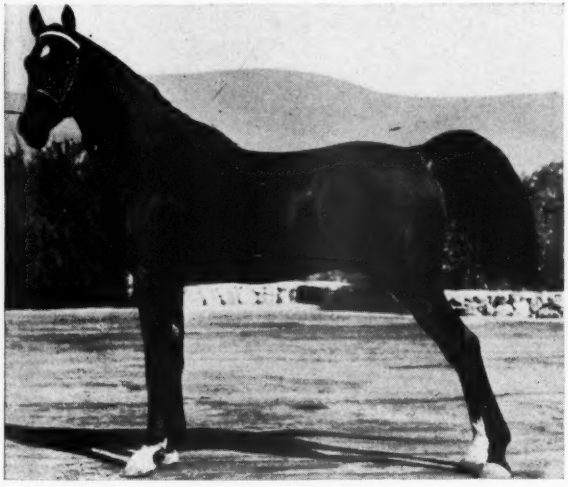


Arabian Horse
This beautiful animal "King John" from the Kellogg Ranch in California was used in the movie: "The Scarlet Empress."

The Hackney was founded by a grandson of Darley Arabian, called Blaze.

Our Morgan horse goes back to Arabian aniestry through the English thoroughbred.

American saddlebred horses possess a good percentage of Arabian blood through the thoroughbred and Morgan. While only meager traces were kept of them, because of the Civil War, the desert-bred Arabs imported into Kentucky by Keene Richards in 1855 no doubt had an important bearing on the saddle horses produced in later years in that state.



A Typical Arabian Stallion
This is "Sikin," a purebred Arabian owned by the Kellogg Institute of Animal Husbandry, Pomona, California.

Later History

In 1906, Homer Davenport, the cartoonist, brought 26 Arabian horses to this country. Davenport died a few years

later; the horses were then taken over by Peter Bradley, and the work was continued by the Hingham Stock Farm in Massachusetts. Considerable stock was distributed from this establishment to various parts of the country, and a good percentage of the animals appearing in the Arabian stud book are traceable to the Davenport importation.

The W. K. Kellogg Institute of Animal Husbandry, at Pomona, California, has as its purpose the perpetuation of the choicest blood from the above various sources.

France has always considered Arabian blood of prime importance in developing horses for military use. Our War Department is using them for the same purpose.

The pure Arabian is noted for its fine disposition, high intelligence, natural beauty, great endurance, easy gait and admirable adaptability.

This Issue

The limitations of space have compelled us to defer the publication of a considerable number of excellent articles prepared for this special issue, among them being:

Horse Practice Then and Now, by L. A. Merillat.

Saliva Testing of Racehorses, by L. L. Newman.

Equine Intravenous Medication, by E. B. Ingmand.

Equine Practice in Malaya, by A. R. Robertson.

Restraint for Treating the Hind Feet, by W. V. Stevens.

The Palomino, by Verne Scott.

Treatment of Septic Conditions of the Phalanges, by Vilo T. Rose.

Bicornual Pregnancy in the Mare, by Georg Lichtenstern.

Equine Practice in Peru, by Daniel A. Tovar.

Equine Practice in Puerto Rico, by Wilbur McPherson, and

The Horse in South Africa, by G. Martinaglia.

Abstracts from European Veterinary Literature.

These articles will appear in early issues.

The Front Cover

We are indebted to J. A. Estes, Editor of *The Blood Horse,* Lexington, Ky., for our beautiful frontispiece. Mr. Estes says: "This is a study of the heads of Annette K. and Brushup, the grandam and dam of War Admiral, the leading 3-year-old Thoroughbred racer of 1937 and probably the best horse sired by Man o' War, generally regarded as the greatest Thoroughbred ever seen in America. War Admiral, unlike his strapping sire, is under the average size for his breed, a characteristic taken from the maternal side of his pedigree. Annette K., now 17 years old, by Harry of Hereford out of imported Bathing Girl, by Spearmint, stands slightly over 15 hands at the withers, and her daughter Brushup, by Sweep (also a small horse), is slightly less than 15 hands in height. Both mares are owned by Samuel D. Riddle, owner of Man o' War and breeder and owner of War Admiral. Annette K. was imported in utero by Walter M. Jeffords, and was given to Mr. Riddle. She raced only once, at two, and was unplaced. She is the dam of the good stakes winner War Glory, by Man o' War, and two other winners. Brushup raced three times at two without winning. War Admiral is her second foal. The first was Flag Raising by Man o' War's son American Flag), winner of one cheap race at four years of age. Brushup, now 9 years old, is expected to foal a brother or sister to War Admiral this year."

The Blood Horse is devoted to the interests of the turf and necessary to the library of any veterinarian interested in the thoroughbred.

While diagnosis is the cornerstone of practice, owners want cures more than anything else. We often use a mild, non-toxic line of treatment while endeavoring to ferret out the correct trouble. One must do something at once and make his diagnosis as he goes along. A pleasant conversation with the owner or attendant will often give more clues in five minutes than the most painstaking examination made without this history.